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TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

NBSIR 80-1822

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORT NO. 61S
STRENGTH TESTS

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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- Smoothness
- Surface pick strength
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TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

Report No. 61S
STRENGTH TESTS

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NBSIR 80-1822

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 61S and 61G comprise the first set of reports for the 79-80 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Notes and comments to individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 1 of this report for an explanation of "Best Values". Please do not confuse these Best Values with provisional values included with the samples to detect serious discrepancies at the time of test.

If there are any questions on the notes, the analyses, or the reports in general, contact Robert G. Powell or Jeffrey Horlick on 301/921-2946.

Jeffrey Horlick

Jeffrey Horlick, Administrator
NBS-TAPPI Collaborative Reference Program
Office of Testing Laboratory Evaluation Technology

February 1, 1980

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

BACKGROUND AND PURPOSE

In 1969, the National Bureau of Standards and the Technical Association of the Pulp and Paper Industry established a collaborative reference program to provide a participating laboratory with a means to check periodically the level and uniformity of its testing in comparison with that of other laboratories.

The interchange of paper and board products and of the raw materials for these products requires agreement among raw material suppliers, paper and board producers, converters, distributors, retailers, commercial testing laboratories, user organizations and the ultimate consumer as to the meaning of test results, an agreement that cannot be achieved without accurate and precise testing. This program is designed to help assure agreement.

HOW THE PROGRAM WORKS

Participants Select the Tests in which they wish to participate. This choice is made on joining the program, but additional tests may be added at any time. Also new participants may enter the program at any time.

Test Samples are Distributed Bimonthly; i.e. every 2 months.

Provisional Values are Provided with the Samples for one or both of the test levels, depending on method. The provisional values permit serious discrepancies to be detected without delay. (It is left to the discretion of the laboratory supervisor as to whether these values should be known to the operator.)

Each Participant Tests the Samples, following instructions provided for each test method. The full check on a single instrument should normally take no more than 30 minutes. The test results are then sent to NBS for analysis. The participant is also asked to report other information relevant to an accurate analysis, such as test conditions and the instruments used.

Industry Means, Best Values and Other Statistics are developed from the data by NBS. The best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries.

A Quick Report is Prepared for each participating laboratory reporting data on time. This report shows the industry mean values, and the deviations of the laboratory's results from these values for each test method.

A Longer Summary Report, Showing the Data from all Participants, is also prepared. In the summary report, of which this report is an example, each laboratory is identified by a code number so that the information is maintained on a confidential basis. However, instruments are identified by type so participants can compare their results with those obtained on similar instruments of different manufacture. This report includes test averages, best values and standard deviations for individual participants and for the group as a whole. A participant should be able to readily determine the level and variability of his results in comparison with those of the other laboratories.

Repeatability and Reproducibility Statements such as Contained in ASTM, TAPPI and ISO Standards are included at the end of the report. Participants can check their performance level against the precision statement given in the test method or specification.

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61-2 Opacity, Paper Backing, Elrepho type, News Paper
62-1 Opacity, White (89%) Backing, Tracing Paper
62-2 Opacity, Paper Backing, Elrepho type, Tracing Paper
65-1 Blue Reflectance (Brightness), Directional
65-2 Blue Reflectance, Diffuse, Elrepho (Gloss Trap)
65-3 Blue Reflectance, Diffuse, Elrepho (No Gloss Trap)
75-1 Specular Gloss, 75 degree, High Range
76-1 Specular Gloss, 75 degree, Low Range
90-1 Thickness (Caliper)
95-1 Grammage (Basis Weight)

TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

Physical Quantity	To Convert From	To	Multiply by
Bursting strength	psi	kPa	6.895
	kg/cm^2	kPa	98.07
	bar	kPa	100.00
Tearing strength	g	mN	9.807
Tensile strength	lb/in.	kN/m	.1751
	lb/0.5 in.	kN/m	.3502
	lb/15 mm	kN/m	.2965
	kg/15 mm	kN/m	.6538
	kg/25 mm	kN/m	.3923
	kg/mm	kN/m	9.807
Tensile energy absorption	$ft\text{-}lb/ft^2$	J/m^2	14.59
	$in.\text{-}lb/in.^2$	J/m^2	175.1
	$kg\text{-}m/m^2$	J/m^2	9.807
Bending stiffness	g·cm	μN·m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI)	lb	N	4.448
(ISO)	lb/6.00 in.	kN/m	0.0292
Thickness	mil	μm	25.40

MEAN - The average of individual TEST DETERMINATIONS. The number of TEST DETERMINATIONS in the mean is given in the upper right corner of the first table (TEST D.) and again at the bottom of this table.

GRAND MEAN (GR. MEAN) - The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an X, #, or *. The GRAND MEAN is given in US customary units and, where applicable, in SI metric units.

SD OF MEANS (SD MEANS) - The standard deviation of the laboratory MEANS about the GRAND MEAN; an index of the among-laboratory precision.

DEV - The deviation or difference of the laboratory MEAN from the GRAND MEAN.

N. DEV - The normal deviate or ratio of the DEV to the SD OF MEANS; an indication of the degree of divergence of the laboratory MEAN from the GRAND MEAN. A N. DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.

SDR - The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.

AVERAGE SDR - The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.

R. SDR - The relative standard deviation of repeated measurements; that is, the ratio of the SDR to the AVERAGE SDR: an indication of the ability of a participant to repeat his or her measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R. SDR should be to unity. If R. SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test Determinations	Lower limit for R. SDR	Upper limit for P. SDR
3	0.09	2.58
4	0.18	2.25
5	0.26	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

VAR - Code for instrument type or variation in condition, see second table.

F - Flag, with following meaning:

0 - Included in grand mean and inside 95% error ellipse.
* - Included in grand means but plotted point falls outside of the 95% error ellipse. The participant should take this as a warning to reexamine his or her testing procedure.
X - Excluded because plotted point would fall outside of the 99% error ellipse, (see page 2 for explanation of Graph).
- Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See the notes following Table 1 for each method).
+ - Excluded from grand means because VAR was non-standard for the analysis.
M - Excluded because data for one sample are missing.
S - Included in grand mean but only after omission of one or more 'wild' values; that is test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.

Best values - Given at the end of table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (+/-) limits, when these are shown along with the best values.

COORDINATES - Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.

95% ELLIPSE - Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.

AVG R. SDR - Average of the R. SDs for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph - For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45 degrees. The solid sloping line, which may or may not lie close to the 45 degree line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 95% of the points representing the laboratories.

Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'M'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he or she is following.

The graph is plotted with an ellipse when there are 20 or more laboratories in the analysis. When there are 10 through 19 laboratories in the analysis, the graph is plotted but the ellipse is omitted. When there are fewer than 10 laboratories retained in the analysis, the graph is not plotted.

The International System of Units (SI) is used on the plots wherever possible to aid participants in familiarizing themselves with SI. Grand means in SI units are given at the top of the plot, and supplementary scales in SI units are drawn along the axes allowing the reader to compare means and variability in common units and SI units for the same data.

SUMMARY - (At end of report) In addition to several quantities already defined above, the summary shows the following values for each test method:

REPL CRP - The number of replicate test determinations used in this Collaborative Reference Program.

REPL TAPPI - The number of replicate test determinations in a test result required by the applicable TAPPI Official Test Method or assumed here if there is no TAPPI Official Test Method. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVERAGE SDR. See TAPPI Official Test Method T1200 for definitions and computations.

REPEAT - TAPPI repeatability; a measure of the within-laboratory precision of a test result.

REPROD - TAPPI reproducibility, a measure of the between-laboratory precision of a test result.

ANALYSIS T10-1 TABLE 1

BURSTING STRENGTH, PSI

TAPPI OFFICIAL TEST METHOD T403 OS-76, PERKINS MODEL C

LAB CODE	SAMPLE J68 MEAN	PRINTING 76 GRAMS PER SQUARE METER DEV	No DEV	SDR	Ro SDR	SAMPLE K38 MEAN	PRINTING 75 GRAMS PER SQUARE METER DEV	No DEV	SDR	Ro SDR	TEST Do = 15 VAR	F	LAB
L121	16.85	-.24	-.19	.90	.84	29.58	1.16	.61	1.12	.58	10C	@	L121
L134	16.40	-.70	-.54	.83	.77	30.47	2.05	1.08	1.25	.64	10C	@	L134
L150	18.37	1.27	.96	1.33	1.24	26.37	-.05	-.03	1.57	.81	10C	@	L150
L153	18.37	1.27	.96	.93	.87	30.80	2.38	1.25	1.68	.87	10C	@	L153
L158	17.33	.24	.18	1.40	1.30	27.53	-.89	-.47	2.17	1.12	10C	@	L158
L167	17.31	.21	.16	.87	.83	28.27	-.15	-.08	1.47	.76	10C	@	L167
L183	17.27	.17	.13	1.10	1.02	27.37	-1.05	-.56	1.77	.91	10C	@	L183
L191	14.07	-2.43	-1.86	1.71	1.59	29.17	.75	.39	2.40	1.24	10C	@	L191
L203A	16.35	-.75	-.58	1.19	1.11	26.35	-2.07	-1.09	2.31	1.20	10C	@	L203A
L203B	16.28	-.81	-.63	1.37	1.27	30.87	2.45	1.29	1.92	.99	10C	@	L203B
L207	17.67	.57	.44	1.27	1.18	30.03	1.61	.85	1.46	.76	10C	@	L207
L212	17.17	.07	.05	1.35	1.25	30.83	2.41	1.27	3.00	1.55	10C	@	L212
L223A	18.49	1.39	1.06	1.47	1.37	30.20	1.78	.94	2.23	1.16	10C	@	L223A
L225	17.40	.30	.23	1.21	1.13	29.73	1.31	.69	1.99	1.03	10C	@	L225
L237A	17.10	.00	.00	.85	.79	27.67	-.75	-.40	1.58	.82	10C	@	L237A
L237B	16.77	-.33	-.26	.96	.46	26.20	-2.22	-1.17	1.00	.52	10C	@	L237B
L249	15.19	-1.91	-1.46	.76	.70	24.37	-4.05	-2.13	2.35	1.22	10C	@	L249
L261	17.20	.10	.08	1.13	1.05	28.83	.41	.22	1.80	.93	10C	@	L261
L264	16.73	-.36	-.28	.70	.65	27.33	-1.09	-.57	1.18	.61	10C	@	L264
L279	17.70	.60	.47	1.05	.98	31.43	3.01	1.59	2.81	1.45	10C	@	L279
L305	17.20	.10	.08	.59	.55	31.30	2.88	1.52	1.24	.64	10C	@	L305
L312	16.60	-.50	-.39	.60	.56	29.33	.91	.48	1.48	.77	10C	@	L312
L315	18.23	1.14	.88	.90	.84	31.63	3.21	1.69	1.43	.74	10C	@	L315
L326	19.10	2.00	1.55	1.18	1.10	26.60	.38	.20	2.11	1.09	10C	@	L326
L330	18.40	1.30	1.01	.75	.70	29.52	1.10	.58	2.29	1.18	10C	@	L330
L333	15.33	-1.76	-1.37	2.79	2.60	25.67	-2.55	-1.34	4.03	2.09	10C	@	L333
L339	11.67	-5.43	-4.21	1.08	1.00	26.18	-8.24	-4.34	1.86	.96	10C	#	L339
L344	17.97	.87	.67	2.38	2.21	27.17	-1.25	-.66	3.39	1.75	10C	@	L344
L356	19.36	2.27	1.76	1.03	.95	25.97	-2.45	-1.29	1.18	.61	10C	*	L356
L358	15.97	-1.13	-.88	.09	.04	27.97	-.45	-.24	1.01	.52	10C	@	L358
L360	17.83	.74	.57	.41	.38	28.13	-.29	-.15	1.95	1.01	10C	@	L360
L366	17.93	.84	.65	1.27	1.18	27.00	-1.42	-.75	2.10	1.09	10C	@	L366
L386	13.53	-3.56	-2.76	1.02	1.51	26.47	-1.95	-1.03	2.50	1.29	10C	*	L386
L390	17.10	.00	.00	1.18	1.10	26.07	-.35	-.19	1.81	.94	10C	@	L390
L568	18.13	1.03	.80	1.17	1.09	27.69	-.73	-.39	1.97	1.02	10C	@	L568
L573	14.00	-3.10	-2.40	.68	.62	24.71	-3.71	-1.96	1.05	.54	10C	*	L573
L599	17.95	.86	.66	.68	.64	29.01	.59	.31	2.13	1.10	10C	@	L599
L684	16.50	-.60	-.46	.73	.68	26.03	-2.39	-1.26	1.11	.57	10C	@	L684
L696	17.95	.85	.66	.80	.74	29.94	1.52	.80	2.59	1.34	10C	@	L696

GRo MEAN = 17.10 PSI — GRAND MEAN = 26.42 PSI — TEST DETERMINATIONS = 15

SD MEANS = 1.29 PSI — SD OF MEANS = 1.90 PSI — 38 LABS IN GRAND MEANS

AVERAGE SDR = 1.08 PSI — AVERAGE SDR = 1.93 PSI

GRo MEAN = 117.9 KILOPASCAL — GRAND MEAN = 196.0 KILOPASCAL

L128	17.53	.44	.34	1.00	.93	27.87	-.55	-.29	1.55	.80	10B	*	L128
L219	20.81	3.71	2.88	.94	.88	30.82	2.40	1.27	1.00	.52	10T	*	L219
L242	19.62	2.53	1.96	.80	.74	30.69	2.27	1.20	2.53	1.31	10T	*	L242
L250L	1677.17	1660.07	1286.76	81.60	75.88	2561.00	2552.58	1343.98	121.93	63.04	10N	*	L250L
L251	18.56	1.40	1.08	.90	.84	26.56	.14	.08	2.21	1.14	10V	*	L251
L260	15.17	-1.93	-1.50	1.37	1.28	25.33	-3.09	-1.63	1.57	.81	10X	*	L260
L269	22.40	5.30	4.11	1.45	1.35	32.47	4.05	2.13	1.51	.78	10A	*	L269
L484	15.97	-1.13	-.88	.92	.85	25.40	-3.02	-1.59	1.68	.87	10M	*	L484

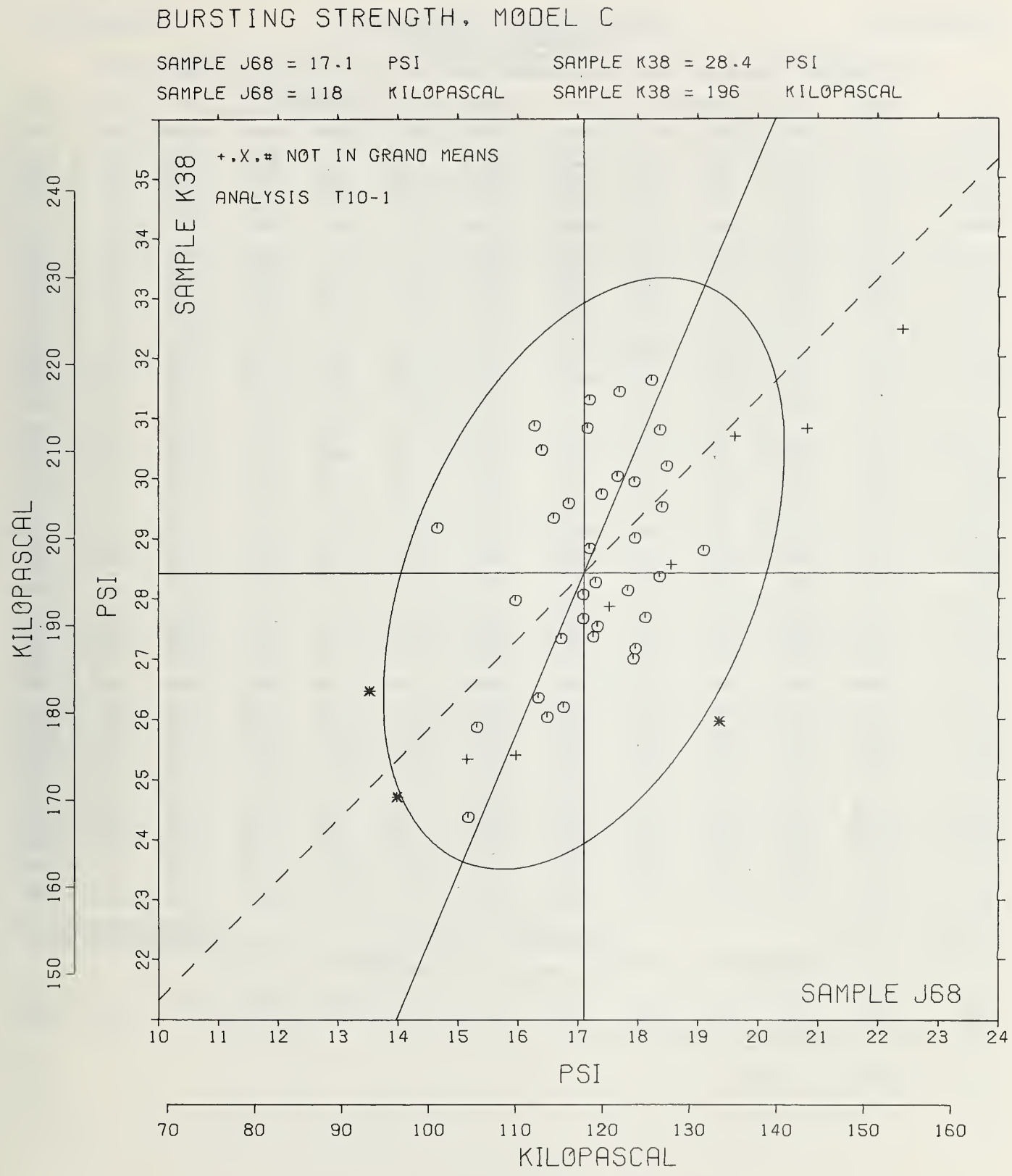
TOTAL NUMBER OF LABORATORIES REPORTING = 47

Best values: J68 17.2 ± 2.2 psi
K38 28.3 ± 3.0 psi

The following laboratories were omitted from the grand means because of extreme test results: 339.

ANALYSIS T10-1 TABLE 2
BURSTING STRENGTH, PSI
TAPPI OFFICIAL TEST METHOD T403 OS-76, PERKINS MODEL C

LAB CODE	F	MEANS J68	MEANS K38	COORDINATES MAJOR	COORDINATES MINOR	AVG DEV VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	*	11.67	20.18	-9.79	1.81	.98	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L386	*	13.53	26.47	-3.16	2.53	1.40	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L573	*	14.00	24.71	-4.03	1.41	.93	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L191	G	14.67	29.17	-.20	2.53	1.42	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L260	*	15.17	25.33	-3.59	.98	1.04	10X BURSTING STRENGTH 10 TO 40 PSI: GIVE INST'N, MAKE,MODEL,CLAMP
L249	G	15.19	24.37	-4.48	.19	.96	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L333	G	15.33	25.87	-3.04	.63	2.34	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L484	*	15.97	25.40	-3.22	-.13	.00	10M BURSTING STRENGTH 10 TO 40 PSI,REGMED MT/MOT,MANUAL CLAMP
L358	G	15.97	27.97	-.00	.87	.58	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L203B	G	16.26	30.87	1.94	1.70	1.13	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L203A	G	16.35	26.35	-2.20	-.12	1.19	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L134	G	16.40	30.47	1.01	1.44	.71	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L684	G	16.50	26.03	-2.43	-.38	.03	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L312	G	16.60	29.33	.05	.81	.06	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L264	G	16.73	27.33	-1.14	-.09	.03	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L237B	G	16.77	26.20	-2.17	-.36	.45	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L121	G	16.85	29.58	.97	.07	.71	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L390	G	17.10	28.07	-.33	-.14	1.02	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L237A	G	17.10	27.67	-.09	-.30	.00	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L212	G	17.17	30.33	2.25	.87	1.40	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L261	G	17.20	28.83	.42	.07	.59	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L305	G	17.20	31.30	2.69	1.02	.59	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L183	G	17.27	27.37	-.91	-.57	.97	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L167	G	17.31	28.27	-.06	-.25	.04	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L158	G	17.33	27.53	-.73	-.56	1.21	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L225	G	17.40	29.73	1.33	.23	1.08	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L128	*	17.53	27.87	-.34	-.62	.89	10B BURSTING STRENGTH 10 TO 40 PSI, PERKINS E, MANUAL CLAMP
L207	G	17.67	30.03	1.71	.10	.97	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L279	G	17.70	31.43	3.01	.61	1.21	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L360	G	17.83	28.13	.02	-.79	.69	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L366	G	17.93	27.00	-.98	-1.32	1.13	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L696	G	17.95	29.94	1.73	-.19	1.04	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L599	G	17.95	29.01	.87	-.96	.02	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L344	G	17.97	27.17	-.82	-1.29	1.54	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L568	G	18.13	27.69	-.28	-1.23	1.05	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L315	G	18.23	31.63	3.40	.20	.79	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L153	G	18.37	30.80	2.69	-.25	.07	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L150	G	18.37	28.37	.44	-1.19	1.02	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L330	G	18.40	29.52	1.52	-.77	.94	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L223A	G	18.49	30.20	2.18	-.59	1.26	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L251	*	18.56	28.56	.70	-1.29	.95	10V BURSTING STRENGTH 10 TO 40 PSI, L*W,MANUAL CLAMP, 20C,65% RH
L326	G	19.10	28.80	1.13	-1.70	1.10	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L356	*	19.36	25.97	-1.96	-3.04	.78	10C BURSTING STRENGTH 10 TO 40 PSI, PERKINS C, MANUAL CLAMP
L242	*	19.62	30.69	3.07	-1.45	1.03	10T BURSTING STRENGTH 10 TO 40 PSI, L*W,MANUAL CLAMP
L219	*	20.81	30.82	3.06	-2.49	.70	10T BURSTING STRENGTH 10 TO 40 PSI, L*W,MANUAL CLAMP
L269	*	22.40	32.47	5.79	-3.32	1.07	10A BURSTING STRENGTH 10 TO 40 PSI, PERKINS A, MANUAL CLAMP
L250L	*	1677.17	2531.00	299.91	-538.51	69.46	10N BURSTING STRENGTH 10 TO 40 PSI,LHGMARGY,MAN. CLAMP, 20C,65%PH
GMEANS:		17.10	28.42			1.00	
		95% ELLIPSE:		5.19	2.89	WITH GAMMA = 67 DEGREES	


BURSTING STRENGTH, MODEL C
SAMPLE J68 = 17.1 PSI
SAMPLE J68 = 118 KILOPASCAL
SAMPLE K38 = 28.4 PSI
SAMPLE K38 = 196 KILOPASCAL
+.X.* NOT IN GRAND MEANS
ANALYSIS T10-1
SAMPLE K38
SAMPLE J68
PSI
KILOPASCAL
22 23 24 25 26 27 28 29 30 31 32 33 34 35
150 160 170 180 190 200 210 220 230 240
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
70 80 90 100 110 120 130 140 150 160

ANALYSIS T10-2 TABLE 1
BURSTING STRENGTH, PSI
TAPPI OFFICIAL TEST METHOD T403 OS-76, PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

LAB CODE	SAMPLE J68 PRINTING 76 GRAMS PER SQUARE METER MEAN	DEV	NO.DEV	SDR	RO.SDR	SAMPLE K38 PRINTING 75 GRAMS PER SQUARE METER MEAN	DEV	NO.DEV	SDR	RO.SDR	VAR	F	LAB	TEST DO. = 15
L105	18.20	1.14	.71	1.37	1.24	28.67	1.10	.48	2.06	1.16	10D	@	L105	
L106C	17.33	.27	.17	.82	.74	26.77	-.80	-.35	1.72	.97	10D	@	L106C	
L115	17.20	.14	.09	.77	.70	30.07	2.50	1.10	1.45	.82	10D	@	L115	
L118	19.28	2.22	1.39	1.44	1.30	29.57	2.00	.88	1.67	.94	10D	@	L118	
L122	17.93	.87	.54	1.33	1.20	27.40	-.17	-.07	1.59	.90	10F	@	L122	
L125	12.70	-4.30	-2.70	5.00	4.51	22.99	-4.58	-2.01	3.66	2.06	10D	*	L125	
L141	17.63	.57	.36	.95	.86	27.87	.30	.13	2.65	1.49	10D	@	L141	
L148	18.13	1.07	.67	.92	.83	29.67	2.30	1.01	1.77	1.00	10D	@	L148	
L157	19.07	2.01	1.25	1.34	1.21	30.60	3.03	1.33	2.82	1.59	10D	@	L157	
L159	15.27	-1.79	-1.11	1.22	1.10	24.48	-3.09	-1.36	2.00	1.13	10D	@	L159	
L162	13.33	-3.73	-2.31	1.45	1.31	27.67	.30	.13	1.96	1.10	10D	X	L162	
L163	17.63	.57	.36	1.03	.93	28.07	.50	.22	1.73	.98	10D	@	L163	
L166	17.87	.81	.50	1.25	1.12	30.63	3.06	1.44	1.23	.70	10D	@	L166	
L176	15.80	-1.26	-.78	1.26	1.14	24.27	-3.30	-1.45	2.19	1.23	10D	@	L176	
L185	18.07	1.01	.62	.70	.63	25.73	2.16	.95	2.19	1.23	10D	@	L185	
L190C	17.40	.34	.21	1.72	1.56	27.40	-.17	-.07	1.24	.70	10D	@	L190C	
L190R	17.20	.14	.09	1.08	.98	27.53	-.04	-.02	1.30	.73	10D	@	L190R	
L194	18.53	1.47	.91	.81	.73	26.10	.53	.23	1.53	.86	10D	@	L194	
L217	18.67	1.81	1.12	1.13	1.02	27.60	.03	.01	2.13	1.20	10F	@	L217	
L224	17.83	.77	.48	.99	.90	29.43	1.86	.82	2.03	1.14	10D	@	L224	
L226B	17.85	.79	.49	1.29	1.17	28.29	.72	.32	1.68	.95	10D	@	L226B	
L226C	17.80	.74	.46	1.19	1.08	29.83	2.26	1.00	1.69	.95	10D	@	L226C	
L233	15.32	-1.74	-1.08	1.31	1.18	26.11	-1.46	-.64	1.23	.70	10D	@	L233	
L241	18.13	1.07	.67	1.04	1.48	29.53	1.96	.86	1.64	.93	10D	@	L241	
L248	17.30	.24	.15	1.05	.95	26.81	-.76	-.34	1.94	1.09	10K	@	L248	
L262	18.37	1.31	.81	.72	.65	29.13	1.56	.69	1.29	.73	10D	@	L262	
L275	14.81	-2.25	-1.39	.68	.79	25.08	-2.49	-1.10	2.13	1.20	10D	@	L275	
L280	19.55	2.49	1.55	.07	.61	30.61	3.04	1.34	1.89	1.07	10D	@	L280	
L285	16.93	-.13	-.08	1.62	1.47	29.27	1.70	.75	2.60	1.47	10D	@	L285	
L309	16.05	-1.01	-.62	1.23	1.13	27.03	-.54	-.24	1.70	.96	10D	@	L309	
L313	15.07	-1.99	-1.23	.72	.65	24.27	-3.30	-1.45	1.49	.84	10I	@	L313	
L341	17.23	.17	.11	.76	.69	27.30	-.27	-.12	1.08	.61	10D	@	L341	
L352	15.94	-1.12	-.69	1.08	.97	25.25	-2.32	-1.02	1.42	.80	10D	@	L352	
L563	13.19	-3.87	-2.40	1.25	1.12	22.10	-5.47	-2.41	1.58	.89	10U	@	L563	
L567	16.53	-.53	-.33	.84	.75	26.29	-1.28	-.56	1.62	.91	10D	@	L567	
L575	17.17	.11	.07	1.50	1.41	26.17	-1.40	-.61	2.05	1.16	10D	@	L575	
L581	18.47	1.41	.87	.83	.75	29.47	1.90	.83	2.05	1.16	10D	@	L581	
L587	17.80	.74	.46	1.15	1.03	27.10	-.47	-.21	1.31	.74	10D	@	L587	
L652	13.77	-3.29	-2.04	.90	.82	25.13	-2.44	-1.07	1.84	1.04	10D	@	L652	
L680	15.30	-1.76	-1.09	1.31	1.18	25.23	-2.34	-1.03	1.86	1.05	10D	@	L680	
L698	17.81	.75	.46	1.09	.98	31.52	3.95	1.74	3.94	2.22	10D	*	L698	

GR. MEAN = 17.06 PSI — GRAND MEAN = 27.57 PSI — TEST DETERMINATIONS = 15
SD MEANS = 1.61 PSI — SD OF MEANS = 2.27 PSI — 40 LABS IN GRAND MEANS
AVERAGE SDR = 1.11 PSI — AVERAGE SDR = 1.77 PSI
GR. MEAN = 117.6 KILOPASCAL — GRAND MEAN = 190.1 KILOPASCAL

L337	29.50	12.44	7.71	1.03	1.47	42.60	14.43	6.35	2.37	1.34	10H	*	L337
L704	15.17	-1.89	-1.17	1.54	1.39	NO DATA REPORTED FOR SAMPLE K38					10L	*	L704

TOTAL NUMBER OF LABORATORIES REPORTING = 43

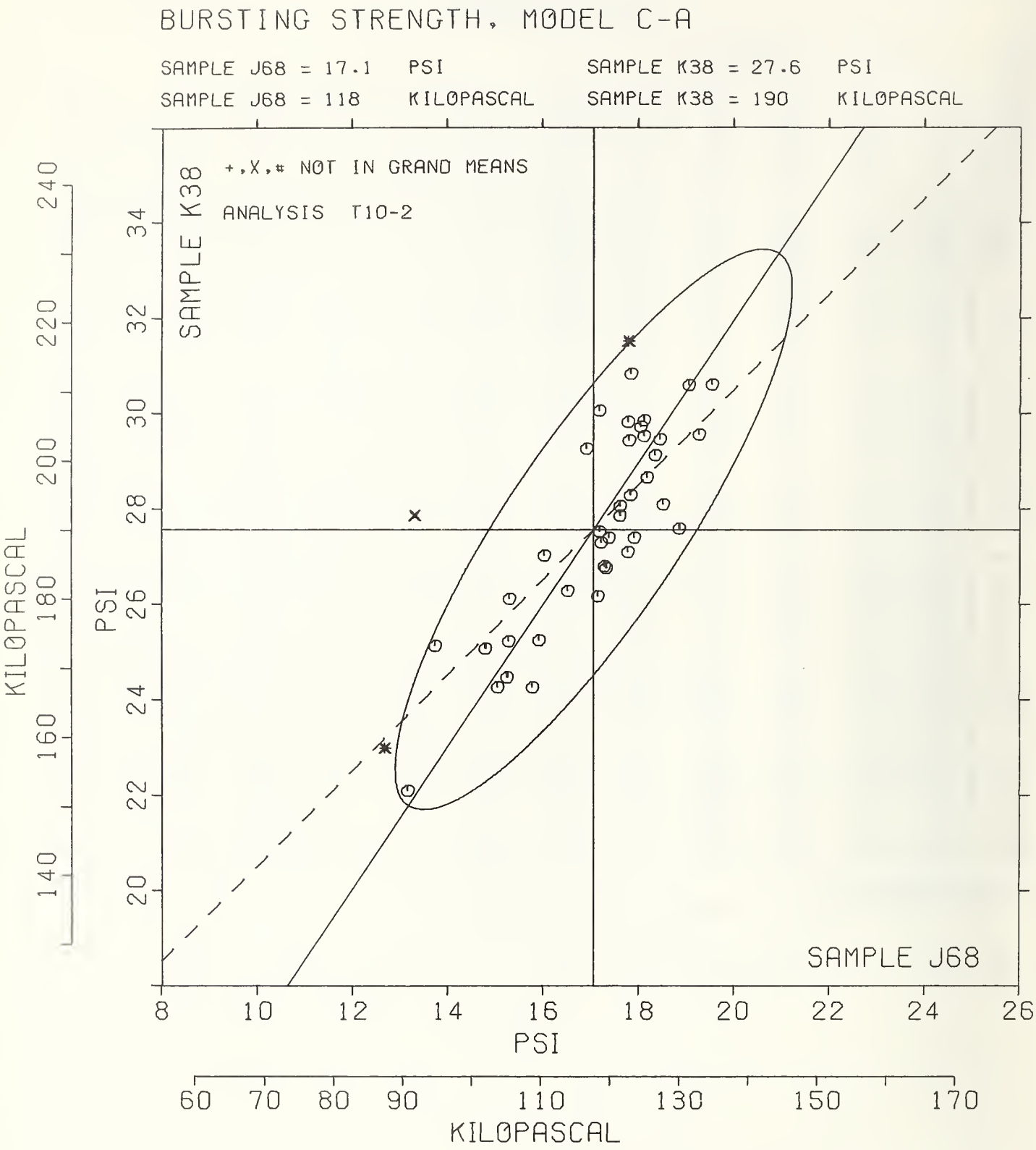
Best values: J68 17.3 ± 2.2 psi
K38 27.6 ± 3.4 psi

ANALYSIS T10-2 TABLE 2

BURSTING STRENGTH, PSI

TAPPI OFFICIAL TEST METHOD T403 OS-76, PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

LAB CODE	F	MEANS J68	MEANS K38	COORDINATES MAJOR	COORDINATES MINOR	AVG DEVN VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L125	*	12.70	22.99	-0.25	1.07	3.29	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L563	O	13.19	22.10	-0.70	.17	1.01	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L162	X	13.33	27.87	-1.83	3.26	1.21	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L652	O	13.77	25.13	-3.80	1.38	.93	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L275	O	14.81	25.08	-3.32	.48	1.00	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L313	O	15.07	24.27	-3.85	-.19	.75	10I BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L704	*	15.17			1.39	10L	BURSTING STRENGTH 10 TO 40 PSI, PERKINS LC, MANUAL CLAMP
L159	O	15.27	24.48	-3.37	-.23	1.12	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L680	O	15.30	25.23	-2.92	.16	1.11	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L233	O	15.32	26.11	-2.18	.63	.94	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L176	O	15.80	24.27	-3.44	-.79	1.19	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L352	O	15.94	25.25	-2.55	-.36	.89	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L309	O	16.05	27.03	-1.01	.53	1.04	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L567	O	16.53	26.29	-1.36	-.28	.83	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L285	O	16.93	29.27	1.34	1.05	1.47	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L575	O	17.17	26.17	-1.10	-.67	1.28	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L115	O	17.20	30.07	2.15	1.27	.76	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L190R	O	17.20	27.53	.05	-.14	.88	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L341	O	17.23	27.30	-.13	-.29	.82	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L248	O	17.30	26.81	-.50	-.63	1.02	10A BURSTING STRENGTH 10 TO 40 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L106C	O	17.33	26.77	-.51	-.68	.85	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L190C	O	17.40	27.40	.05	-.38	1.13	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L141	O	17.63	27.87	.57	-.31	1.16	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L163	O	17.63	28.07	.73	-.20	.93	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L587	O	17.80	27.10	.02	-.88	.89	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L226C	O	17.80	29.83	2.29	.65	1.01	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L698	*	17.81	31.52	3.70	1.58	1.00	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L224	O	17.83	29.43	1.98	.40	1.02	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L226B	O	17.85	28.29	1.04	-.26	1.06	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L166	O	17.87	30.83	3.16	1.15	.91	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L122	O	17.93	27.40	.35	-.82	1.05	10A BURSTING STRENGTH 10 TO 40 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L185	O	18.07	29.73	2.30	.37	.93	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L148	O	18.13	29.87	2.31	.39	.91	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L241	O	18.13	29.53	2.23	.20	1.20	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L105	O	18.20	28.67	1.55	-.34	1.20	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L262	O	18.37	29.13	2.03	-.21	.89	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L581	O	18.47	29.47	2.30	-.11	.95	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L194	O	18.53	28.10	1.20	-.93	.80	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L217	O	18.87	27.60	1.03	-1.48	1.11	10A BURSTING STRENGTH 10 TO 40 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L157	O	19.07	30.60	3.64	.02	1.40	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L118	O	19.28	29.57	2.90	-.73	1.12	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L280	O	19.55	30.61	3.92	-.38	.84	10D BURSTING STRENGTH 10 TO 40 PSI, PERKINS CA OR C, AIR CLAMP
L337	*	29.50	42.00	16.92	-2.29	1.40	10H BURSTING STRENGTH 10 TO 40 PSI, PERKINS AB, HYDRAULIC CLAMP
GMEANS:		17.06	27.57			1.00	
		95% ELLIPSE:		.95	1.84	WITH GAMMA = 56 DEGREES	


BURSTING STRENGTH, MODEL C-A
SAMPLE J68 = 17.1 PSI
SAMPLE J68 = 118 KILOPASCAL
SAMPLE K38 = 27.6 PSI
SAMPLE K38 = 190 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T10-2
SAMPLE K38
SAMPLE J68
PSI
KILOPASCAL
20 22 24 26 28 30 32 34
140 160 180 200 220 240
8 10 12 14 16 18 20 22 24 26
60 70 80 90 110 130 150 170

ANALYSIS T11-1 TABLE 1

BURSTING STRENGTH, PSI - HIGH RANGE

TAPPI OFFICIAL TEST METHOD T403 OS-76, PERKINS MODEL C OR C-A

LAB CODE	SAMPLE K28 MEAN	BLEACHED 105 GRAMS PER SQUARE METER DEV	No. DEV	SDR	R. SDR	SAMPLE B63 MEAN	KRAFT 124 GRAMS PER SQUARE METER DEV	No. DEV	SDR	R. SDR	VAR	F	LAB
											TEST Do = 15		
L107	51.7	2.0	.83	4.5	1.19	64.1	2.5	.79	3.4	.84	11C	@	L107
L118	49.8	.1	.05	4.0	1.06	60.0	4.3	1.36	4.7	1.15	11D	@	L118
L122	50.2	.3	.22	2.8	.75	63.1	1.4	.45	5.1	1.24	11F	@	L122
L128	49.1	-.6	-.25	2.5	.66	60.3	-1.3	-.40	3.0	.73	11D	@	L128
L141	53.2	3.6	1.48	5.9	1.58	67.0	5.4	1.68	4.3	1.07	11D	@	L141
L148	51.1	1.4	.56	3.4	.91	62.9	1.2	.39	3.0	.74	11D	@	L148
L159	45.9	-3.7	-1.55	5.4	1.45	57.0	-4.6	-1.43	4.7	1.16	11D	@	L159
L170	50.9	1.2	.51	1.3	.36	61.2	-.4	-.12	1.4	.35	11C	@	L170
L176	47.9	-1.7	-.73	3.0	.80	63.5	1.9	.60	4.5	1.10	11D	@	L176
L182	49.6	-.1	-.05	3.6	.96	63.1	1.4	.45	3.7	.90	11D	@	L182
L218	52.7	3.1	1.28	3.8	1.02	65.9	4.3	1.35	6.1	1.50	11D	@	L218
L219	46.9	-2.7	-1.14	4.3	1.20	58.3	-3.4	-1.05	3.7	.91	11C	@	L219
L237A	50.5	.8	.33	2.6	.70	59.5	-2.1	-.65	2.6	.65	11C	@	L237A
L237B	49.3	-.4	-.16	2.0	.53	60.8	-.9	-.27	2.7	.65	11C	@	L237B
L248	48.6	-1.0	-.43	3.6	.96	60.8	-.8	-.25	2.9	.72	11K	@	L248
L278	47.0	-2.7	-1.12	4.1	1.09	57.2	-4.4	-1.37	4.4	1.09	11C	@	L278
L279	63.7	14.0	5.85	4.0	1.06	75.7	14.0	4.39	9.3	2.28	11C	#	L279
L280	50.9	1.2	.50	3.6	.95	65.2	1.6	.51	4.3	1.05	11D	@	L280
L294	51.4	1.7	.72	4.0	1.06	59.4	-2.2	-.69	4.9	1.20	11C	@	L294
L303	44.8	-4.8	-2.02	2.7	.73	56.6	-5.1	-1.58	3.2	.79	11C	@	L303
L311	55.1	5.5	2.28	6.2	1.65	66.5	4.9	1.54	7.7	1.88	11C	@	L311
L330	51.9	2.3	.95	4.8	1.27	63.8	2.2	.68	4.0	.99	11C	@	L330
L333	49.1	-.5	-.20	4.3	1.15	61.2	-.4	-.13	3.5	.85	11C	@	L333
L334	52.4	2.8	1.15	4.0	1.08	64.0	2.4	.75	2.9	.72	11D	@	L334
L339	46.2	-3.5	-1.48	2.5	.67	55.9	-5.8	-1.80	4.4	1.09	11C	@	L339
L344	50.6	.9	.37	2.6	.69	64.1	2.5	.78	6.3	1.55	11C	@	L344
L348	48.2	-1.5	-.63	4.2	1.13	58.4	-3.2	-1.00	4.9	1.21	11C	@	L348
L356	50.9	1.2	.50	3.4	.91	63.0	1.3	.42	3.9	.97	11C	@	L356
L563	45.3	-4.4	-1.85	2.8	.75	56.1	-5.5	-1.73	6.2	1.52	11Y	@	L563
L565	47.9	-1.8	-.75	1.8	.47	61.2	-.5	-.14	2.8	.69	11D	@	L565
L567	48.0	-1.7	-.70	3.4	.92	62.0	.4	.12	2.4	.59	11D	@	L567
L575	48.8	-.9	-.37	0.7	1.79	59.6	-2.0	-.62	6.1	1.51	11D	@	L575
L576	51.1	1.4	.58	5.8	1.54	63.3	1.7	.54	3.6	.89	11P	@	L576
L581	50.5	.8	.34	3.5	.94	60.7	-.9	-.29	3.2	.78	11D	@	L581
L599	51.2	1.5	.63	2.7	.73	66.1	4.5	1.40	6.2	1.51	11C	@	L599
L604	48.8	-.8	-.33	4.8	1.24	57.2	-4.4	-1.38	3.8	.93	11C	@	L604
L622	48.0	-1.6	-.68	4.1	1.09	62.7	1.1	.35	3.7	.92	11E	@	L622
L650	48.7	-1.0	-.41	4.9	1.31	59.2	-2.4	-.75	3.6	.88	11D	@	L650
L651	55.1	5.4	2.29	3.8	.96	68.0	6.4	1.99	3.4	.83	11D	@	L651
L680	48.0	-1.7	-.71	2.8	.74	60.0	-1.7	-.52	3.5	.85	11D	@	L680

GR. MEAN = 49.7 PSI — GRAND MEAN = 61.6 PSI — TEST DETERMINATIONS = 15

SD MEANS = 2.4 PSI — SD OF MEANS = 3.2 PSI — 39 LABS IN GRAND MEANS

AVERAGE SDR = 3.8 PSI — AVERAGE SDR = 4.1 PSI

GR. MEAN = 342.5 KILOPASCAL — GRAND MEAN = 424.8 KILOPASCAL

L242	53.6	4.3	1.80	4.8	1.28	66.2	4.6	1.44	5.8	1.43	11T	*	L242
L250I	4364.5	4314.8	1799.30	31.6	84.81	5350.5	5288.9	1652.06	224.6	55.21	11N	*	L250I
L251	52.1	2.4	1.01	3.7	.99	62.8	1.2	.38	4.7	1.16	11V	*	L251
L290	53.6	3.9	1.64	2.6	.70	64.2	2.6	.81	3.5	.86	11A	*	L290
L393	51.3	1.6	.66	4.9	1.31	66.7	5.0	1.58	3.6	.88	11H	*	L393
L394	59.1	9.4	3.92	5.2	1.40	71.9	10.3	3.22	5.6	1.39	11H	*	L394
L484	50.3	.7	.27	4.0	1.06	61.0	-.6	-.19	3.4	.83	11H	*	L484
L570	52.0	2.3	.97	2.2	.59	61.5	-.1	-.03	4.0	.97	11H	*	L570
L593	65.7	16.0	6.67	5.9	1.58	74.1	12.4	3.89	7.8	1.92	11J	*	L593
L598	53.5	3.9	1.61	0.4	2.24	71.1	9.5	2.97	6.3	1.55	11B	*	L598

TOTAL NUMBER OF LABORATORIES REPORTING = 50

Best values: K28 50 ± 4 psi
B63 62 ± 5 psi

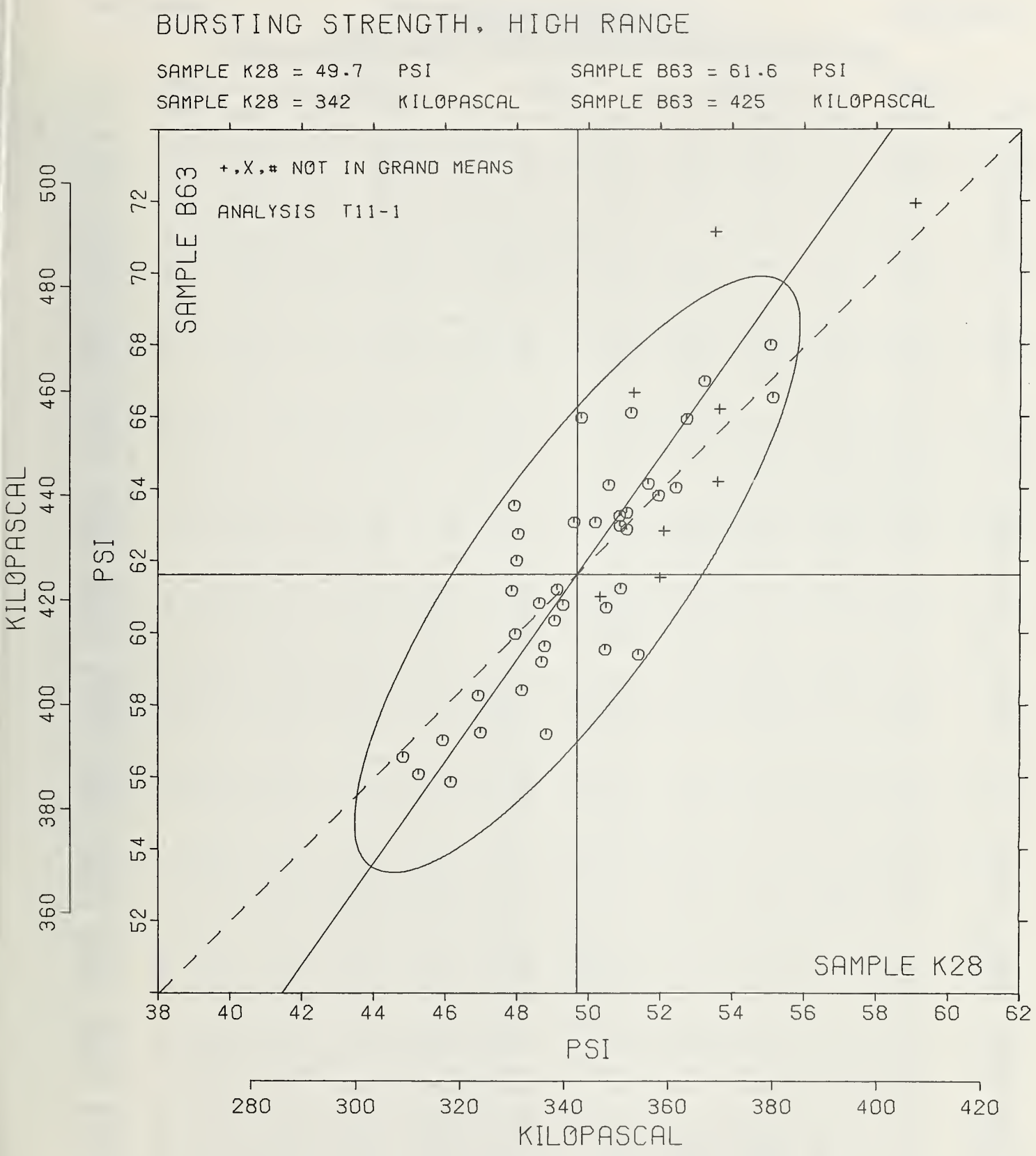
The following laboratories were omitted from the grand means because of extreme test results: 279.

ANALYSIS T11-1 TABLE 2

BURSTING STRENGTH, PSI - HIGH RANGE

TAPPI OFFICIAL TEST METHOD T403 OS-76, PERKINS MODEL C OR C-A

LAB CODE	F	MEANS B28	MEANS B63	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SQR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L303	0	44.8	56.6	-6.9	1.0	.76	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L563	0	45.3	56.1	-7.1	.4	1.14	11Y	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L159	0	45.9	57.0	-5.9	.4	1.00	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L339	0	46.2	55.9	-6.7	-.5	.88	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L219	0	46.9	58.3	-4.3	.3	1.00	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L278	0	47.0	57.2	-5.1	-.3	1.09	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L565	0	47.9	61.2	-1.4	1.2	.58	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L176	0	47.9	63.5	.0	2.5	.95	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L680	0	48.0	60.0	-2.3	.4	.79	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L567	0	48.0	62.0	-.7	1.6	.76	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L622	0	48.0	62.7	-.0	2.0	1.00	11E	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L348	0	48.2	58.4	-3.5	-.6	1.17	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L248	0	48.6	60.8	-1.2	.4	.84	11K	BURSTING STRENGTH 40 TO 85 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L650	0	48.7	59.2	-2.5	-.6	1.09	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L575	0	48.8	59.6	-2.1	-.4	1.05	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L604	0	48.8	57.2	-4.1	-1.9	1.09	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L128	0	49.1	60.3	-1.4	-.2	.70	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L333	0	49.1	61.2	-.7	.2	1.00	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L237B	0	49.3	60.8	-.9	-.2	.59	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L182	0	49.6	63.1	1.1	.9	.53	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L118	0	49.8	66.0	3.6	2.4	1.11	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L122	0	50.2	63.1	1.5	.4	1.00	11F	BURSTING STRENGTH 40 TO 85 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L484	*	50.3	61.0	-.1	-.9	.95	11H	BURSTING STRENGTH 40 TO 85 PSI, PERKINS AB, HYDRAULIC CLAMP
L237A	0	50.5	59.5	-1.2	-1.8	.68	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L581	0	50.5	60.7	-.3	-1.2	.86	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L344	0	50.6	64.1	2.5	.7	1.12	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L280	0	50.9	63.2	2.0	-.0	1.00	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L356	0	50.9	63.0	1.8	-.2	.94	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L170	0	50.9	61.2	.4	-1.2	.95	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L576	0	51.1	63.3	2.2	-.1	1.22	11F	BURSTING STRENGTH 40 TO 85 PSI, PERKINS LC, MANUAL CLAMP
L148	0	51.1	62.9	1.8	-.4	.85	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L599	0	51.2	66.1	4.5	1.4	1.12	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L393	*	51.3	66.7	5.0	1.6	1.09	11H	BURSTING STRENGTH 40 TO 85 PSI, PERKINS AB, HYDRAULIC CLAMP
L294	0	51.4	59.4	-.8	-2.7	1.13	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L107	0	51.7	64.1	3.2	-.2	1.02	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L330	0	51.9	63.8	3.1	-.6	1.13	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L570	*	52.0	61.5	1.3	-1.9	.78	11H	BURSTING STRENGTH 40 TO 85 PSI, PERKINS AB, HYDRAULIC CLAMP
L251	*	52.1	62.8	2.4	-1.3	1.08	11V	BURSTING STRENGTH 40 TO 85 PSI, L*W,MANUAL CLAMP, 20C,65% RH
L334	0	52.4	64.0	3.6	-.9	.90	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L218	0	52.7	65.9	5.3	-.0	1.26	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L141	0	53.2	67.0	6.5	.2	1.03	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L598	*	53.5	71.1	10.0	2.3	1.00	11A	BURSTING STRENGTH 40 TO 85 PSI, MESSMER, MANUAL CLAMP
L290	*	53.6	64.2	4.4	-1.7	.78	11A	BURSTING STRENGTH 40 TO 85 PSI, PERKINS A, MANUAL CLAMP
L242	*	53.6	66.2	6.1	-.6	1.05	11T	BURSTING STRENGTH 40 TO 85 PSI, L*W,MANUAL CLAMP
L651	0	55.1	68.0	8.3	-.7	.89	11D	BURSTING STRENGTH 40 TO 85 PSI, PERKINS CA, AIR CLAMP
L311	0	55.1	66.5	7.2	-1.6	1.77	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L394	*	59.1	71.9	13.0	-1.7	1.09	11H	BURSTING STRENGTH 40 TO 85 PSI, PERKINS AB, HYDRAULIC CLAMP
L279	#	63.7	75.7	19.6	-3.3	1.07	11C	BURSTING STRENGTH 40 TO 85 PSI, PERKINS C, MANUAL CLAMP
L593	*	65.7	74.1	19.4	-5.9	1.75	11J	BURSTING STRENGTH 40 TO 85 PSI, PERKINS JUMBO,HAND DRIVEN
L250L	*	4364.5	5350.5	6809.3	-472.4	70.01	11N	BURSTING STRENGTH 40 TO 85 PSI,LHOMARGY,MAN.CLAMP, 20C,65%RH
GMEANS:		49.7	61.6			1.00		
		95% ELLIPSE:		9.9	2.9	WITH GAMMA = 54 DEGREES		


BURSTING STRENGTH, HIGH RANGE
SAMPLE K28 = 49.7 PSI
SAMPLE K28 = 342 KILOPASCAL
SAMPLE B63 = 61.6 PSI
SAMPLE B63 = 425 KILOPASCAL
+,X,# NOT IN GRAND MEANS
ANALYSIS T11-1
SAMPLE B63
SAMPLE K28
PSI
KILOPASCAL
52 54 56 58 60 62 64 66 68 70 72
360 380 400 420 440 460 480 500
38 40 42 44 46 48 50 52 54 56 58 60 62
280 300 320 340 360 380 400 420

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	SAMPLE G08 MEAN	WAITING 61 GRAMS PER SQUARE METER DEV	No DEV	SDR	Ro SDR	SAMPLE L66 MEAN	BOND 79 GRAMS PER SQUARE METER DEV	No DEV	SDR	Ro SDR	TEST Do = 15 VAR	F	LAB
L105	36.5	-2.4	-1.20	1.0	1.03	39.1	-1.0	-.46	2.7	2.16	15T	G	L105
L107	37.6	-1.4	-.71	1.0	1.00	35.7	-4.4	-2.00	2.0	1.58	15T	G	L107
L115	38.1	-.9	-.46	1.4	.93	36.0	-4.2	-1.88	.8	.68	15C	G	L115
L118	37.8	-1.2	-.60	1.3	.85	38.6	-1.6	-.71	.6	.51	15T	G	L118
L121	35.2	-3.8	-1.90	1.0	.05	36.7	-3.5	-1.58	1.0	.78	15T	G	L121
L124	39.2	.2	.13	.9	.61	40.6	.4	.20	.8	.66	15T	G	L124
L128	39.5	.6	.30	.8	.54	40.1	-.1	-.04	.8	.64	15T	G	L128
L134	39.9	1.0	.51	1.1	.71	42.2	2.0	.93	1.3	1.01	15C	G	L134
L139	38.8	-.2	-.08	.9	.56	40.4	.2	.11	1.1	.90	15T	G	L139
L141	39.7	.7	.37	2.0	1.26	39.3	-.8	-.37	1.3	1.08	15T	G	L141
L143	36.9	-2.1	-1.09	1.6	1.03	38.6	-1.6	-.71	1.2	.95	15T	G	L143
L148	38.9	-.0	-.01	1.6	1.18	39.7	-.4	-.19	.7	.56	15T	G	L148
L150	50.9	11.9	6.21	1.5	.97	49.3	9.1	4.13	.8	.64	15T	#	L150
L153	38.2	-.8	-.39	1.1	.74	39.7	-.5	-.22	1.5	1.23	15C	G	L153
L157	37.1	-1.8	-.90	1.4	.91	37.5	-2.7	-1.22	2.5	2.00	15T	G	L157
L158	41.9	2.9	1.52	2.4	1.58	39.6	-.6	-.25	1.7	1.38	15R	G	L158
L159	38.6	-.4	-.16	2.6	1.60	39.8	-.4	-.16	1.2	.97	15L	G	L159
L162	37.2	-1.8	-.94	1.1	.74	38.1	-2.0	-.92	.9	.73	15T	G	L162
L163	38.7	-.3	-.15	1.1	.72	38.8	-1.4	-.61	1.0	.81	15T	G	L163
L166	39.8	.8	.44	.9	.61	39.5	-.7	-.31	.9	.73	15T	G	L166
L167	40.5	1.6	.82	1.0	.64	42.6	2.4	1.11	.7	.59	15C	G	L167
L170	32.7	-6.2	-3.24	.8	.52	35.5	-4.6	-2.09	.9	.73	15T	*	L170
L176	41.3	2.4	1.24	2.4	1.52	41.2	1.0	.47	2.4	1.89	15T	G	L176
L182A	37.1	-1.9	-.98	1.6	1.13	39.0	-1.2	-.52	1.1	.86	15A	G	L182A
L182T	41.3	2.4	1.24	2.2	1.44	42.3	2.2	.99	1.6	1.31	15T	G	L182T
L183	37.8	-1.2	-.60	1.0	.65	37.3	-2.8	-1.28	.6	.49	15T	G	L183
L185	39.2	.2	.13	1.4	.89	41.0	.8	.38	1.3	1.00	15T	G	L185
L189	37.5	-1.4	-.74	.9	.59	39.7	-.5	-.22	.9	.72	15T	G	L189
L190C	39.1	.1	.06	2.3	1.63	40.7	.6	.26	1.4	1.11	15T	G	L190C
L190R	39.0	.0	.03	1.4	.86	40.5	.4	.17	.8	.67	15C	G	L190R
L191	36.7	-2.3	-1.19	1.2	.80	40.3	.1	.05	1.5	1.19	15T	G	L191
L194	42.2	3.2	1.65	.9	.61	43.6	3.4	1.54	1.2	.98	15T	G	L194
L195	38.5	-.5	-.26	1.9	1.24	40.7	.5	.23	2.1	1.67	15C	G	L195
L206	39.7	.8	.41	1.5	.96	41.3	1.1	.50	1.2	.93	15T	G	L206
L207	49.4	10.4	5.43	1.2	.77	53.5	13.3	6.02	2.0	1.60	15R	#	L207
L211	39.7	.6	.41	1.3	.83	40.3	.2	.08	.8	.65	15R	G	L211
L212	37.2	-1.8	-.91	2.7	1.76	35.9	-4.3	-1.94	1.4	1.08	15T	G	L212
L213	38.8	-.2	-.08	1.5	.95	43.1	2.9	1.32	1.3	1.02	15T	G	L213
L217	41.2	2.2	1.15	1.7	1.09	41.5	1.3	.59	.8	.65	15Q	G	L217
L219	37.3	-1.6	-.84	2.0	1.26	36.8	-3.4	-1.52	1.7	1.32	15L	G	L219
L223	39.4	.3	.23	1.2	.77	40.3	.1	.04	.6	.48	15K	G	L223
L224	37.4	-1.6	-.81	1.5	.97	38.5	-1.6	-.74	.7	.59	15T	G	L224
L225	40.2	1.2	.63	1.1	.74	44.2	4.0	1.83	1.0	.81	15T	G	L225
L228	52.4	13.4	7.01	1.7	1.11	54.9	14.8	6.70	1.3	1.02	15T	#	L228
L233	39.0	.0	.03	1.3	.81	39.6	-.6	-.25	1.2	.99	15T	G	L233
L237A	37.1	-1.8	-.95	1.2	.80	40.0	-.2	-.07	.8	.68	15T	G	L237A
L237B	38.8	-.2	-.08	1.9	1.20	43.3	3.1	1.41	1.3	1.07	15T	G	L237B
L241	40.9	2.0	1.05	.9	.57	43.5	3.4	1.53	.5	.41	15T	G	L241
L242	40.3	1.3	.70	1.8	1.05	40.7	.6	.25	1.8	1.46	15U	G	L242
L244	39.3	.4	.20	1.0	.66	40.4	.2	.11	1.4	1.12	15C	G	L244
L248	38.6	-.3	-.17	1.3	.99	41.3	1.1	.51	.8	.61	15J	G	L248
L249	36.7	-2.3	-1.19	1.0	.68	37.7	-2.5	-1.13	1.4	1.12	15T	G	L249
L254	39.3	.4	.20	1.4	.93	40.1	-.0	-.01	1.6	1.28	15T	G	L254
L259	43.3	4.3	2.25	1.3	.86	46.3	6.1	2.77	1.0	.77	15T	*	L259
L261	37.3	-1.7	-.86	.9	.57	38.5	-1.6	-.74	.9	.73	15T	G	L261
L262	39.1	.2	.09	.9	.59	42.1	2.0	.90	1.1	.90	15T	G	L262
L264	38.9	-.0	-.01	2.4	1.53	37.1	-3.1	-1.40	1.8	1.46	15T	G	L264
L273	42.9	3.9	2.04	1.7	1.11	41.1	1.0	.44	1.2	1.00	15T	G	L273
L275	39.0	.0	.03	1.3	.95	42.1	2.0	.90	1.2	1.00	15T	G	L275
L277	42.1	3.1	1.62	2.0	1.30	42.1	1.9	.87	1.3	1.07	15T	G	L277
L278	40.4	1.4	.73	1.4	.87	41.6	1.4	.65	1.5	1.24	15T	G	L278
L279	38.7	-.3	-.15	5.5	3.54	39.5	-.7	-.31	1.4	1.13	15T	G	L279
L280	38.1	-.8	-.43	1.1	.73	39.9	-.2	-.10	1.0	.83	15L	G	L280
L281	41.3	2.4	1.24	2.0	1.26	44.3	4.1	1.86	1.1	.88	15T	G	L281
L285	46.8	7.8	4.09	3.0	1.94	38.8	-1.4	-.61	3.3	2.62	15T	X	L285

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	SAMPLE G08 MEAN	WRITING 61 GRAMS PER SQUARE METER DEV	NO.DEV	SDR	R.SDR	SAMPLE E86 MEAN	BOND 79 GRAMS PER SQUARE METER DEV	NO.DEV	SDR	R.SDR	TEST D.= 15 VAR	F	LAB
L288	40.7	1.7	.09	.9	.58	41.0	.8	.38	1.2	.96	15T	6	L288
L290	39.3	.4	.20	1.1	.72	45.3	5.1	2.32	1.0	.77	15T	*	L290
L291	37.1	-1.8	-.95	1.2	.77	41.3	1.1	.50	1.3	1.07	15A	6	L291
L303	42.1	3.2	1.66	2.2	1.42	40.1	-.1	-.04	.6	.47	15L	6	L303
L305	38.6	-.4	-.16	1.1	.72	36.7	-1.5	-.68	1.2	.94	15T	6	L305
L309	39.5	.5	.27	1.4	.88	39.9	-.3	-.13	1.1	.85	15T	6	L309
L311	38.1	-.8	-.45	2.4	1.52	40.3	.1	.05	1.1	.88	15T	6	L311
L312	38.5	-.4	-.22	2.1	1.33	36.5	-3.6	-1.64	1.9	1.54	15T	6	L312
L313	35.9	-3.1	-1.61	1.1	.73	36.0	-4.2	-1.88	.8	.68	15L	6	L313
L315	37.9	-1.1	-.57	1.6	1.06	38.3	-1.8	-.83	.9	.72	15T	6	L315
L328	38.1	-.8	-.43	1.0	.64	39.1	-1.0	-.46	.7	.59	15T	6	L328
L333	37.5	-1.4	-.74	1.5	.94	38.5	-1.7	-.77	1.3	1.04	15T	6	L333
L334	37.1	-1.9	-.96	1.0	.67	39.8	-.4	-.16	1.3	1.06	15T	6	L334
L344	41.5	2.5	1.31	1.6	1.00	41.9	1.8	.80	1.3	1.02	15C	6	L344
L345	37.7	-1.3	-.67	1.1	.72	38.5	-1.7	-.77	1.2	1.00	15T	6	L345
L348	39.6	.6	.34	1.5	1.00	39.7	-.4	-.19	.8	.64	15T	6	L348
L352	41.5	2.6	1.33	.9	.58	42.5	2.3	1.04	.8	.62	15C	6	L352
L358	38.9	-.0	-.01	1.6	1.02	39.2	-.9	-.42	1.2	.97	15T	6	L358
L360	38.9	-.1	-.05	.5	.35	45.5	5.3	2.42	1.4	1.10	15T	*	L360
L376	41.6	2.6	1.36	1.1	.68	41.4	1.2	.56	1.4	1.08	15T	6	L376
L382	42.8	3.8	2.41	6.6	3.87	42.0	1.8	.84	2.1	1.71	15T	6	L382
L386	38.0	-1.0	-.59	1.3	.81	38.5	-1.7	-.77	.7	.59	15T	6	L386
L388	49.6	10.6	5.99	8.3	5.37	45.9	5.7	2.59	.5	.41	15T	#	L388
L390	41.1	2.2	1.14	1.3	.84	42.8	2.6	1.20	1.4	1.10	15T	6	L390
L442	42.9	4.0	2.06	1.0	.62	41.8	1.6	.74	.8	.62	15R	6	L442
L484	43.1	4.2	2.16	2.1	1.33	42.3	2.1	.96	.9	.71	15T	6	L484
L557	40.9	1.9	1.00	1.0	.63	45.3	5.2	2.35	.6	.49	15T	6	L557
L562	38.0	-1.0	-.50	1.3	.85	39.6	-.6	-.25	1.1	.90	15T	6	L562
L565	38.5	-.5	-.25	1.4	.88	38.9	-1.2	-.55	1.4	1.11	15T	6	L565
L566	38.3	-.7	-.35	1.5	.96	40.8	.6	.29	1.3	1.01	15T	6	L566
L567	39.3	.4	.20	1.0	1.05	41.9	1.7	.77	1.6	1.28	15C	6	L567
L574	37.9	-1.0	-.55	3.1	1.97	39.7	-.5	-.22	1.4	1.16	15T	6	L574
L575	36.3	-2.6	-1.37	1.2	.76	38.9	-1.2	-.55	1.0	.77	15L	6	L575
L576	40.0	1.0	.55	1.9	1.24	42.8	2.6	1.20	1.1	.92	15T	6	L576
L580	39.2	.2	.13	1.7	1.07	37.2	-3.0	-1.34	1.0	.81	15T	6	L580
L581	40.5	1.6	.82	1.1	.66	41.9	1.7	.79	.9	.69	15Q	6	L581
L587	38.3	-.7	-.35	1.3	.83	39.7	-.4	-.19	1.5	1.19	15T	6	L587
L597	40.3	1.3	.69	1.6	1.18	39.9	-.3	-.13	1.9	1.54	15T	6	L597
L599	37.6	-1.4	-.71	1.1	.66	40.3	.2	.08	2.1	1.70	15T	6	L599
L600	41.3	2.3	1.21	.9	.57	41.6	1.6	.74	2.0	1.58	15T	6	L600
L604	36.3	-2.7	-1.40	1.5	.96	36.7	-3.5	-1.58	1.0	.78	15T	6	L604
L606	41.3	2.4	1.24	1.6	1.06	43.4	3.2	1.47	1.3	1.04	15T	6	L606
L610	36.3	-2.6	-1.37	1.2	.80	40.2	.0	.02	.9	.75	15T	6	L610
L618	36.4	-2.6	-1.33	4.6	2.94	41.9	1.7	.77	1.8	1.41	15T	*	L618
L622	50.8	11.8	6.16	2.9	1.86	52.4	12.2	5.55	1.4	1.08	15L	#	L622
L626	42.2	3.2	1.67	1.2	.80	39.5	-.6	-.28	1.1	.85	15L	6	L626
L651	36.8	-2.2	-1.12	1.7	1.07	37.1	-3.1	-1.40	1.8	1.46	15T	6	L651
L652	39.5	.5	.27	2.0	1.05	40.5	.4	.17	1.9	1.54	15C	6	L652
L654	39.7	.8	.41	.8	.52	40.9	.8	.35	1.5	1.19	15T	6	L654
L670	37.1	-1.8	-.93	1.7	1.09	38.1	-2.1	-.95	1.3	1.02	15T	6	L670
L676	37.6	-1.4	-.71	1.7	1.11	37.5	-2.7	-1.22	1.2	.95	15T	6	L676
L680	38.9	-.9	-.44	2.6	1.28	38.0	-2.2	-.98	1.3	1.05	15T	6	L680
L684	36.9	-2.0	-1.03	1.7	1.08	36.4	-3.8	-1.70	3.0	2.43	15L	6	L684
L685	54.8	15.8	8.20	1.6	.65	57.5	17.3	7.84	1.2	.95	15T	#	L685
L692	37.2	-1.8	-.91	1.1	.70	41.5	1.4	.62	1.3	1.04	15T	6	L692
L696	34.4	-4.6	-2.37	1.4	.87	38.3	-1.9	-.86	1.0	.83	15T	*	L696
L697	38.0	-1.0	-.50	1.9	1.21	40.7	.5	.22	.8	.68	15T	6	L697
L698	40.6	1.6	.80	1.9	1.22	40.7	.6	.26	1.1	.88	15L	6	L698
L704	42.9	3.9	2.04	2.4	1.58	NO DATA REPORTED FOR SAMPLE E86					15T	M	L704

GR. MEAN = 39.0 GRAMS GRAND MEAN = 40.2 GRAMS TEST DETERMINATIONS = 15

SD MEANS = 1.9 GRAMS SD OF MEANS = 2.2 GRAMS 116 LABS IN GRAND MEANS

AVERAGE SDR = 1.5 GRAMS AVERAGE SDR = 1.3 GRAMS

GR. MEAN = 382.0 MILLINEWTON GRAND MEAN = 393.8 MILLINEWTON

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	SAMPLE G08 MEAN	WAXING 61 GRAMS PER SQUARE METER DEV	N_o DEV	SDR	R_o SDR	SAMPLE E86 MEAN	BOND 79 GRAMS PER SQUARE METER DEV	N_o DEV	SDR	R_o SDR	TEST D_o = 15 VAR	F	LAB
L131	45.1	6.1	3.21	1.7	1.09	43.9	3.7	1.70	1.0	.82	15W	*	L131
L226B	41.8	2.8	1.49	2.0	1.32	41.2	1.0	.47	1.2	.97	15V	*	L226B
L226C	33.1	-5.9	-3.07	1.0	.07	32.3	-7.9	-3.58	1.0	.83	15V	*	L226C
L250L	44.7	5.8	3.02	1.4	1.17	45.4	5.3	2.38	1.4	1.15	15H	*	L250L
L251	38.9	-.1	-.04	1.4	.91	39.7	-.4	-.19	1.5	1.19	15K	*	L251
L301A	38.0	-1.0	-.50	1.5	.95	39.9	-.3	-.13	1.1	.90	15N	*	L301A
L326	41.0	2.0	1.07	2.5	1.60	39.9	-.3	-.13	1.5	1.20	15N	*	L326
L339	37.8	-1.2	-.60	2.0	1.30	39.8	-.4	-.16	1.1	.92	15N	*	L339
L356	42.7	3.7	1.94	2.7	1.72	45.1	4.9	2.22	.8	.64	15N	*	L356
L585	42.0	3.0	1.59	1.6	1.16	40.6	.4	.19	1.0	.78	15E	*	L585
L705	60.5	21.6	11.25	5.4	3.50	50.9	10.8	4.88	4.1	3.30	15X	*	L705

TOTAL NUMBER OF LABORATORIES REPORTING = 135

Best values: G08 39 ± 3 grams
E86 40 ± 3 grams

The following laboratories were omitted from the grand means because of extreme test results: 150, 207, 228, 388, 622, 685.

Data from the following laboratories appeared to be off by a multiplicative factor: 226B, 226C. Code 15V was assigned temporarily put in a factor of 2.

ANALYSIS T15-1 TABLE 2

TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

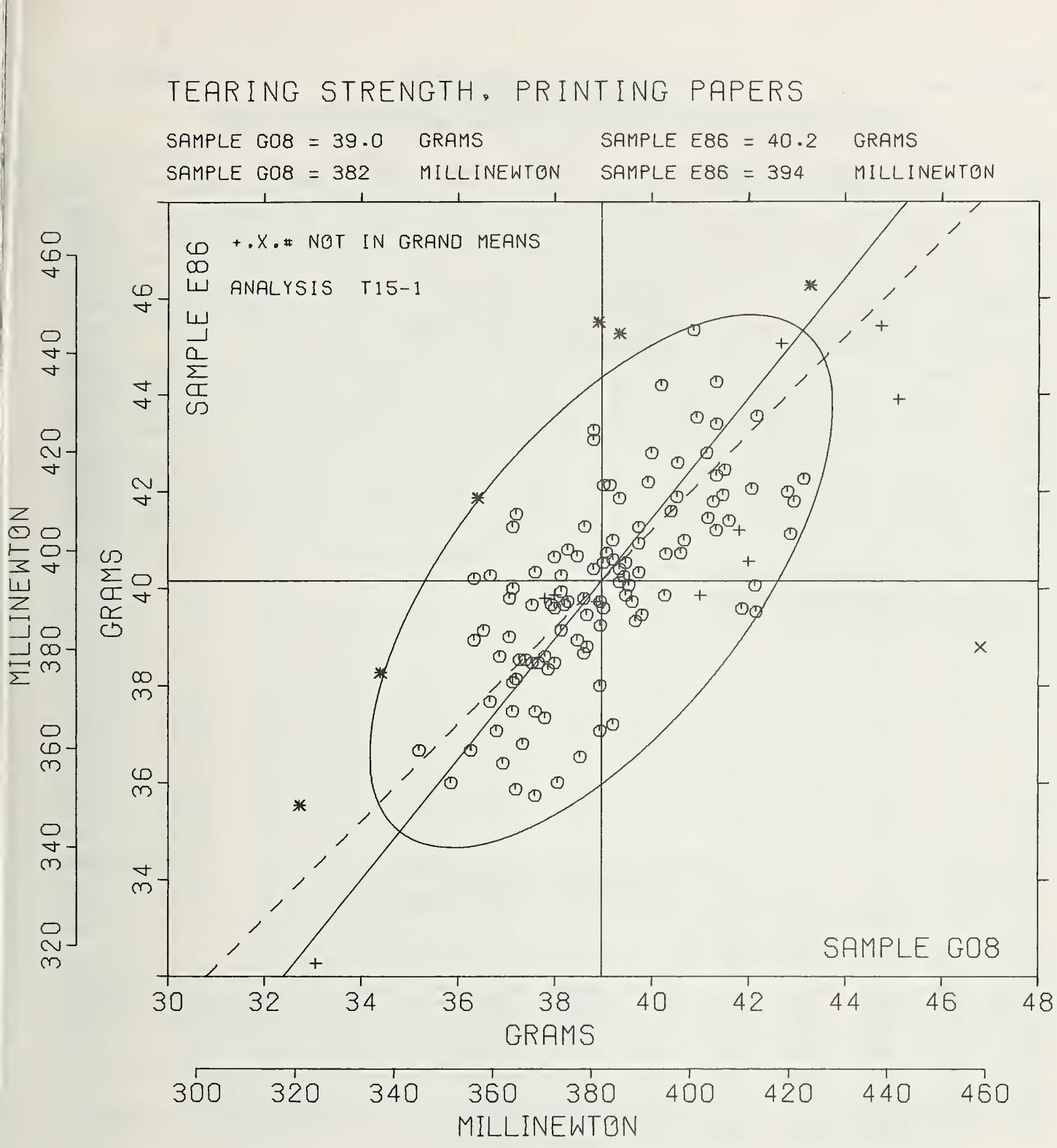
LAB CODE	F	MEANS G08	MEANS E86	COORDINATES MAJOR	COORDINATES MINOR	AVG SQ DEV VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L170	*	32.7	35.5	-7.5	1.9	.062	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L226C	*	33.1	32.3	-9.8	-.4	.075	15V TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF X 2
L696	*	34.4	38.3	-4.3	2.4	.065	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L121	G	35.2	36.7	-3.1	.7	.072	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L313	G	35.9	36.0	-3.2	-.2	.070	15L TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L604	G	36.3	36.7	-4.4	-.1	.087	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L610	G	36.3	40.2	-1.0	2.1	.077	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L575	G	36.3	38.9	-2.0	1.3	.076	15L TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L618	*	36.4	41.9	-.3	3.1	2.018	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L105	G	36.5	39.1	-2.3	1.2	1.059	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L249	G	36.7	37.7	-3.4	.2	.050	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L191	G	36.7	40.3	-1.3	1.8	.059	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L651	G	36.8	37.1	-3.6	-.3	1.247	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L143	G	36.9	38.6	-2.5	.6	.059	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L684	G	36.9	36.4	-4.2	-.8	1.726	15L TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L334	G	37.1	39.8	-1.5	1.2	.066	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L182A	G	37.1	39.0	-2.1	.7	.059	15A TEARING STRENGTH 35 TO 110G, APPITA
L157	G	37.1	37.5	-3.2	-.3	1.046	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L670	G	37.1	38.1	-2.8	.1	1.006	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L291	G	37.1	41.3	-.3	2.1	.052	15A TEARING STRENGTH 35 TO 110G, APPITA
L237A	G	37.1	40.0	-1.3	1.3	.074	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L692	G	37.2	41.5	-.0	2.2	.087	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L162	G	37.2	38.1	-2.7	.1	.074	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L212	G	37.2	35.9	-4.4	-1.3	1.342	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L261	G	37.3	38.5	-2.3	.3	.065	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L219	G	37.3	36.8	-3.6	-.8	1.029	15L TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L224	G	37.4	38.5	-2.2	.2	.078	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L333	G	37.5	38.5	-2.2	.0	.059	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L189	G	37.5	39.7	-1.3	.8	.066	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L107	G	37.6	35.7	-4.3	-1.7	1.029	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L676	G	37.6	37.5	-2.9	-.6	1.063	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L599	G	37.6	40.3	-.7	1.2	1.019	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L345	G	37.7	38.5	-2.1	-.1	.066	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L339	*	37.8	39.8	-1.0	.7	1.211	15N TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF, NO CUT OUT
L118	G	37.8	38.6	-1.9	-.1	.066	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L183	G	37.8	37.3	-2.9	-.9	.057	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L315	G	37.9	38.3	-2.1	-.3	.069	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L574	G	37.9	39.7	-1.0	.5	1.057	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L697	G	38.0	40.7	-.2	1.1	.054	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L301A	*	38.0	39.9	-.8	.6	.052	15N TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF, NO CUT OUT
L562	G	38.0	39.6	-1.0	.4	.067	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L386	G	38.0	38.5	-1.9	-.3	.075	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L115	G	38.1	36.0	-3.8	-1.9	.060	15C TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L328	G	38.1	39.1	-1.3	-.0	.062	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L311	G	38.1	40.3	-.4	.7	1.020	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L280	G	38.1	39.9	-.7	.5	.073	15L TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L153	G	38.2	39.7	-.9	.3	.059	15C TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L587	G	38.3	39.7	-.8	.3	1.001	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L566	G	38.3	40.8	.1	.9	.059	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L565	G	38.5	38.9	-1.3	-.4	.059	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L195	G	38.5	40.7	.1	.7	1.046	15C TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L312	G	38.5	36.5	-3.1	-1.9	1.344	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L159	G	38.6	39.8	-.5	.1	1.026	15L TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L305	G	38.6	38.7	-1.4	-.7	.063	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L248	G	38.6	41.3	.7	1.0	.060	15J TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L163	G	38.7	38.8	-1.2	-.6	.076	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L279	G	38.7	39.5	-.7	-.2	2.333	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L139	G	38.8	40.4	.1	.3	.073	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L213	G	38.8	43.1	2.2	1.9	.059	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L237B	G	38.8	43.3	2.3	2.1	1.013	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L251	*	38.9	39.7	-.4	-.2	1.005	15K TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES, 20 C, 65% RH
L360	*	38.9	45.5	4.1	3.4	.072	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L680	G	38.9	38.0	-1.7	-1.3	1.316	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L148	G	38.9	39.7	-.3	-.3	.067	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L264	G	38.9	37.1	-2.4	-1.9	1.050	15T TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)

ANALYSIS T15-1 TABLE 2

TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	F	MEANS GCB	MEANS E86	COORDINATES MAJOR	COORDINATES MINOR	AVG R.OOBR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L358	G	38.9	39.2	-.7	-.0	1.00	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L190R	G	39.0	40.5	.3	.2	.77	15C	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L275	G	39.0	42.1	1.0	1.2	.97	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L233	G	39.0	39.6	-.4	-.4	.90	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L190C	G	39.1	40.7	.5	.3	1.37	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L262	G	39.1	42.1	1.7	1.1	.75	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L124	G	39.2	40.6	.5	.1	.64	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L580	G	39.2	37.2	-2.1	-2.0	.94	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L185	G	39.2	41.0	.8	.3	.94	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L290	*	39.3	45.3	4.2	2.9	.74	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L254	G	39.3	40.1	.2	-.3	1.11	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L567	G	39.3	41.9	1.6	.8	1.17	15C	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L244	G	39.3	40.4	.4	-.1	.90	15C	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L223	G	39.4	40.3	.4	-.3	.82	15K	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF,DIGITAL READOUT
L309	G	39.5	39.9	.1	-.6	.00	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L652	G	39.5	40.5	.6	-.2	1.00	15C	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L128	G	39.5	40.1	.3	-.5	.99	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L348	G	39.6	39.7	.1	-.8	.82	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L141	G	39.7	39.3	-.2	-1.1	1.17	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L206	G	39.7	41.3	1.4	.1	.95	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L211	G	39.7	40.3	.0	-.5	.74	15K	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF,DIGITAL READOUT
L654	G	39.7	40.9	1.1	-.1	.85	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L166	G	39.8	39.5	-.0	-1.1	.87	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L134	G	39.9	42.2	2.2	.5	.80	15C	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L576	G	40.0	42.8	2.7	.8	1.08	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L225	G	40.2	44.2	3.9	1.6	.78	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L597	G	40.3	39.9	.6	-1.2	1.30	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L242	G	40.3	40.7	1.3	-.7	1.26	15U	TEARING STRENGTH 35 TO 110G, AUSTRALIAN 6PT. CD.
L278	G	40.4	41.6	2.0	-.2	1.06	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L581	G	40.5	41.9	2.3	-.1	.89	15Q	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF,AIR CLAMP,DIGIT
L167	G	40.5	42.6	2.9	.3	.81	15C	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L698	G	40.6	40.7	1.3	-.9	1.05	15L	TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L288	G	40.7	41.0	1.7	-.8	.77	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L557	G	40.9	45.3	5.2	1.8	.90	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L241	G	40.9	43.5	3.9	.0	.49	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L326	*	41.0	39.9	1.1	-1.8	1.40	15N	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF, NO CUT OUT
L390	G	41.1	42.8	3.4	-.0	.97	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L217	G	41.2	41.5	2.4	-.9	.67	15Q	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF,AIR CLAMP,DIGIT
L600	G	41.3	41.8	2.7	-.8	1.07	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L176	G	41.3	41.2	2.3	-1.2	1.71	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L281	G	41.3	44.3	4.7	.7	1.07	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L182T	G	41.3	42.3	3.2	-.5	1.07	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L606	G	41.3	43.4	4.0	.2	.00	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L344	G	41.5	41.9	3.0	-.8	1.01	15C	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L352	G	41.5	42.5	3.4	-.0	.00	15C	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF (W.AIR CLAMP)
L376	G	41.6	41.4	2.0	-1.3	.06	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L226B	*	41.8	41.2	2.6	-1.0	1.14	15V	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF X 2
L158	G	41.9	39.6	1.4	-2.6	1.48	15K	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF,DIGITAL READOUT
L585	*	42.0	40.6	2.2	-2.1	.97	15L	TEARING STRENGTH 35 TO 110G, THWING-ELMENDORF,AMBIENT COND.
L277	G	42.1	42.1	3.4	-1.2	1.18	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L303	G	42.1	40.1	1.9	-2.5	.95	15L	TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L626	G	42.2	39.5	1.5	-2.9	.83	15L	TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L194	G	42.2	43.6	4.7	-.4	.79	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L356	*	42.7	45.1	6.2	.2	1.10	15N	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF, NO CUT OUT
L382	G	42.8	42.0	3.8	-1.8	2.79	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L273	G	42.9	41.1	3.2	-2.4	1.06	15T	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L704	M	42.9				1.38	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L442	G	42.9	41.8	3.6	-2.1	.82	15K	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF,DIGITAL READOUT
L484	G	43.1	42.3	4.3	-1.9	1.02	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L259	#	43.3	46.3	7.5	.5	.02	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L250L	*	44.7	45.4	7.7	-1.2	1.16	15H	TEARING STRENGTH 35 TO 110G, IHOMARGY, 20 C, 65% RH
L131	*	45.1	43.9	6.8	-2.4	.95	15W	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF X .5
L285	X	46.8	38.8	3.9	-7.0	2.26	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L207	#	49.4	53.5	10.9	.2	1.18	15K	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF,DIGITAL READOUT
L388	#	49.6	45.9	11.1	-4.7	2.69	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L622	#	50.8	52.4	17.0	-1.6	1.47	15L	TEARING STRENGTH 35 TO 110G, LORENTZ-WETTRES
L150	#	50.9	49.3	14.6	-3.6	.81	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L[illegible]	#	52.4	54.9	19.9	-1.2	1.07	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L[illegible]	#	54.5	57.5	23.4	-1.5	.80	15I	TEARING STRENGTH 35 TO 110G,THWING-ELMENDORF(SCALE TO 100)
L705	*	60.5	50.9	21.9	-10.1	3.40	15A	TEARING STRENGTH 35 TO 110G: GIVE INSTRUMENT MAKE,MODEL
GMEANS:		39.0	40.2			1.00		
		95% ELLIPSE:		6.6	3.0	WITH GAMMA = 51 DEGREES		


TEARING STRENGTH, PRINTING PAPERS
SAMPLE G08 = 39.0 GRAMS
SAMPLE G08 = 382 MILLINEWTON
SAMPLE E86 = 40.2 GRAMS
SAMPLE E86 = 394 MILLINEWTON
+,X,* NOT IN GRAND MEANS
ANALYSIS T15-1
SAMPLE E86
GRAMS
MILLINEWTON
SAMPLE G08
30 32 34 36 38 40 42 44 46 48
GRAMS
300 320 340 360 380 400 420 440 460
MILLINEWTON

ANALYSIS T16-1 TABLE 1

TEARING STRENGTH, GRAMS - PRIMARILY PACKAGING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	SAMPLE E36 BLEACHED 105 GRAMS PER SQUARE METER MEAN	DEV	NO.DEV	SDR	R.SDR	SAMPLE B63 KRAFT 124 GRAMS PER SQUARE METER MEAN	DEV	NO.DEV	SDR	R.SDR	TEST D. = 15 VAR	F	LAB
L151	118.0	1.9	.32	3.3	.76	125.6	-6.5	-1.09	5.6	1.00	16C	6	L151
L248	110.8	.7	.20	4.0	.94	139.3	7.1	1.20	4.0	.72	16J	6	L248
L324	110.8	-5.3	-1.46	3.3	.76	129.2	-2.9	-.49	5.5	.98	16T	6	L324
L554	118.8	2.7	.74	6.0	1.54	134.4	2.3	.38	7.4	1.31	16C	6	L554
GR. MEAN = 119.1 GRAMS				GRAND MEAN = 132.1 GRAMS					TEST DETERMINATIONS = 15				
SD MEANS = 3.6 GRAMS				SD OF MEANS = 6.0 GRAMS					4 LABS IN GRAND MEANS				
AVERAGE SDR = 4.3 GRAMS						AVERAGE SDR = 5.6 GRAMS							
GR. MEAN =1138.6 MILLINEWTON				GRAND MEAN =1295.6 MILLINEWTON									
L106	109.9	-6.2	-1.72	2.0	.59	58.9	-73.2	-12.24	1.7	.30	16N	*	L106
L148	117.3	1.2	.34	3.0	.84	131.7	-.4	-.06	3.8	.68	16N	*	L148
L231	112.2	-3.9	-1.08	4.1	.95	132.1	.0	.00	5.4	.96	16N	*	L231
L234	121.2	5.1	1.40	3.6	.87	144.5	12.4	2.08	4.2	.75	16N	*	L234
L267	141.5	25.4	6.99	5.9	1.37	166.0	33.9	5.67	5.7	1.01	16N	*	L267
L269	117.3	1.2	.34	6.8	1.58	127.1	-5.0	-.84	5.5	.99	16N	*	L269
L301B	109.3	-6.8	-1.88	3.8	.87	120.4	-5.7	-.96	6.0	1.07	16N	*	L301B
L308	128.0	11.9	3.28	3.7	.85	139.1	7.0	1.16	3.3	.58	16N	*	L308
L341	160.0	43.9	12.09	3.3	.77	156.8	56.7	9.48	5.6	1.00	16N	*	L341
L366	111.7	-4.4	-1.20	4.2	.98	126.5	-5.6	-.93	9.8	1.74	16V	*	L366
L393	104.7	-11.4	-3.15	4.1	.96	121.1	-11.0	-1.85	4.9	.87	16N	*	L393

TOTAL NUMBER OF LABORATORIES REPORTING = 15

Data from the following laboratories appeared to be off by a multiplicative factor: 336.
Code 16V was assigned temporarily to put in a factor of 2.

ANALYSIS T16-1 TABLE 2

TEARING STRENGTH, GRAMS - PRIMARILY PACKAGING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	F	MEANS E36	MEANS B63	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L393	*	104.7	121.1	-13.1	9.0	.91	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L301B	*	109.3	126.4	-7.9	5.6	.87	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L106	*	109.9	58.9	-73.0	-6.5	.43	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L324	6	110.8	129.2	-3.9	4.6	.87	16T	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF(SCALE TO 100)
L366	*	111.7	126.5	-.3	3.2	1.56	16V	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF X 2
L231	*	112.2	132.1	-.8	3.8	.95	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L248	6	116.8	139.3	7.1	.7	.63	16J	TEARING STRENGTH 60 TO 150G, LORENTZ-WETTRES
L148	*	117.3	131.7	-.1	-1.3	.78	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L269	*	117.3	127.1	-4.7	-2.2	1.28	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L151	6	118.0	125.6	-6.0	-3.2	.88	16C	TEARING STRENGTH 60 TO 150G, THWING-ELMENDORF (W.AIR CLAMP)
L554	6	118.8	134.4	2.8	-2.2	1.42	16C	TEARING STRENGTH 60 TO 150G, THWING-ELMENDORF (W.AIR CLAMP)
L234	*	121.2	144.5	13.2	-2.5	.81	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L308	*	128.0	139.1	9.2	-10.3	.72	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L267	*	141.5	166.0	38.3	-18.1	1.49	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
L341	*	160.0	188.8	64.3	-31.7	.88	16N	TEARING STRENGTH 60 TO 150G,THWING-ELMENDORF, NO CUT OUT
GMEANS:		116.1	132.1			1.00		
95% ELLIPSE:		40.1	20.5	WITH GAMMA = 78 DEGREES				

ANALYSIS T19-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PACKAGING PAPERS
TAPPI OFFICIAL TEST METHODS T404 OS-76 AND T494 OS-70, PENDULUM AND CRE TYPES

LAB CODE	SAMPLE K34 MEAN	KRAFT 123 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	SAMPLE J02 MEAN	BLEACHED 98 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L106	9.44	-.11	-.33	.53	.88	5.68	.03	.08	.25	1.15	19A	@	L106
L107	9.95	.41	1.34	.93	1.54	5.98	.32	1.02	.36	1.66	19A	@	L107
L151	9.45	-.10	-.33	.77	1.27	5.25	-.40	-1.26	.18	.84	19A	@	L151
L157A	9.63	.08	.26	.59	.97	5.95	.29	.92	.19	.85	19P	@	L157A
L157I	9.03	-.52	-1.72	.43	.71	5.47	-.19	-.59	.26	1.19	19A	@	L157I
L167	61.19	51.65	171.24	2.66	4.40	35.02	29.37	92.09	1.21	5.48	19G	#	L167
L182I	9.42	-.13	-.43	.55	.91	5.46	-.19	-.61	.19	.87	19D	@	L182I
L182L	9.48	-.07	-.22	.47	.78	5.57	-.08	-.26	.21	.94	19T	@	L182L
L207	9.60	.05	.17	.62	1.03	5.52	-.13	-.41	.21	.94	19A	@	L207
L217A	9.71	.16	.53	.56	.92	5.68	.03	.09	.13	.61	19A	@	L217A
L217P	9.40	-.15	-.50	.59	.97	5.45	-.20	-.63	.20	.92	19P	@	L217P
L219	10.21	.66	2.20	.51	.84	6.06	.40	1.26	.18	.84	19E	@	L219
L225	9.95	.40	1.31	.59	.98	6.08	.42	1.32	.18	.82	19P	@	L225
L237A	9.46	-.09	-.29	.47	.77	6.24	.59	1.85	.23	1.04	19Q	*	L237A
L237B	9.48	-.07	-.22	.70	1.16	5.72	.07	.22	.28	1.27	19A	@	L237B
L264A	9.30	-.25	-.84	.57	.95	5.75	.09	.30	.14	.65	19A	@	L264A
L264P	9.62	.07	.23	.53	.87	6.12	.47	1.47	.22	.99	19P	@	L264P
L265	9.46	-.09	-.31	.48	.79	5.70	.04	.14	.24	1.07	19A	@	L265
L267	9.06	-.49	-1.62	.01	1.02	5.08	-.57	-1.80	.14	.63	19A	@	L267
L273	9.66	.11	.37	.67	1.10	5.73	.08	.25	.26	1.17	19P	@	L273
L278	9.59	.04	.13	.60	.99	5.75	.09	.28	.17	.76	19A	@	L278
L280	9.03	-.52	-1.72	.57	.94	5.17	-.48	-1.51	.49	2.21	19G	@	L280
L281	9.72	.17	.57	.66	1.09	5.71	.05	.17	.13	.61	19G	@	L281
L305	9.51	-.04	-.12	.24	.36	5.91	.26	.81	.20	.90	19P	@	L305
L312	9.50	-.05	-.16	.73	1.20	5.79	.13	.41	.18	.84	19D	@	L312
L318	8.78	-.77	-2.54	.43	.71	4.95	-.71	-2.22	.21	.95	19G	*	L318
L324	9.82	.27	.91	.47	.78	5.54	-.12	-.37	.26	1.19	19A	@	L324
L334	10.07	.52	1.73	.47	.78	5.97	.32	1.00	.20	.93	19P	@	L334
L348	9.21	-.34	-1.11	.56	.92	5.59	-.07	-.21	.16	.73	19P	@	L348
L356	9.71	.16	.52	.82	1.35	5.42	-.24	-.74	.24	1.10	19P	@	L356
L554	9.89	.34	1.13	.63	1.04	6.05	.40	1.25	.24	1.11	19P	@	L554
L562	9.82	.27	.91	1.80	2.97	5.78	.12	.39	.29	1.34	19P	@	L562
L565	9.44	-.11	-.36	.42	.70	6.22	.56	1.76	.16	.72	19T	*	L565
L568	8.21	-1.34	-4.45	.65	1.07	5.20	-.45	-1.43	.23	1.04	19P	#	L568
L575	9.52	-.03	-.10	.47	.78	5.66	.01	.02	.17	.79	19G	@	L575
L576	9.56	.01	.02	.54	.90	5.74	.09	.28	.16	.75	19A	@	L576
L580	9.77	.22	.73	.57	.93	5.89	.24	.74	.17	.75	19G	@	L580
L581	9.51	-.04	-.12	.56	.92	5.44	-.22	-.68	.17	.75	19A	@	L581
L604	9.03	-.52	-1.74	.71	1.18	4.72	-.93	-2.92	.44	1.99	19A	*	L604
L606	9.69	.14	.47	.33	.54	5.66	.00	.00	.20	.93	19P	@	L606
L610	9.36	-.19	-.63	.51	.84	5.56	-.10	-.30	.14	.63	19A	@	L610
L650	9.34	-.20	-.66	.75	1.23	5.45	-.20	-.64	.39	1.76	19G	@	L650
L652	9.65	.10	.33	.54	.90	5.77	.11	.35	.24	1.10	19A	@	L652
L662	10.93	1.38	4.57	.57	.95	6.32	.67	2.10	.29	1.32	19G	#	L662
L676	10.20	.65	2.15	1.15	1.90	5.67	.01	.04	.50	2.25	19A	*	L676
L684	9.50	-.05	-.16	.71	1.17	5.49	-.17	-.52	.35	1.58	19W	@	L684
L689	9.63	.08	.27	.41	.67	5.42	-.24	-.74	.18	.84	19A	@	L689

GR. MEAN = 9.55 KILONEWTON/M — GRAND MEAN = 5.65 KILONEWTON/M — TEST DETERMINATIONS = 20
SD MEANS = .30 KILONEWTON/M — SD OF MEANS = .32 KILONEWTON/M — 44 LABS IN GRAND MEANS
AVERAGE SDR = .01 KILONEWTON/M — AVERAGE SDR = .22 KILONEWTON/M
GR. MEAN = 54.54 LB/INCH — GRAND MEAN = 32.30 LB/INCH

L250I	8.76	-.79	-2.61	.24	.40	4.86	-.80	-2.50	.11	.50	19L	+	L250I
L251	8.08	-1.47	-4.86	.74	1.22	4.56	-1.10	-3.45	.28	1.28	19I	+	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 49

Best values: K34 9.5 ± 0.5 kilonewton per meter
J02 5.6 ± 0.5 kilonewton per meter

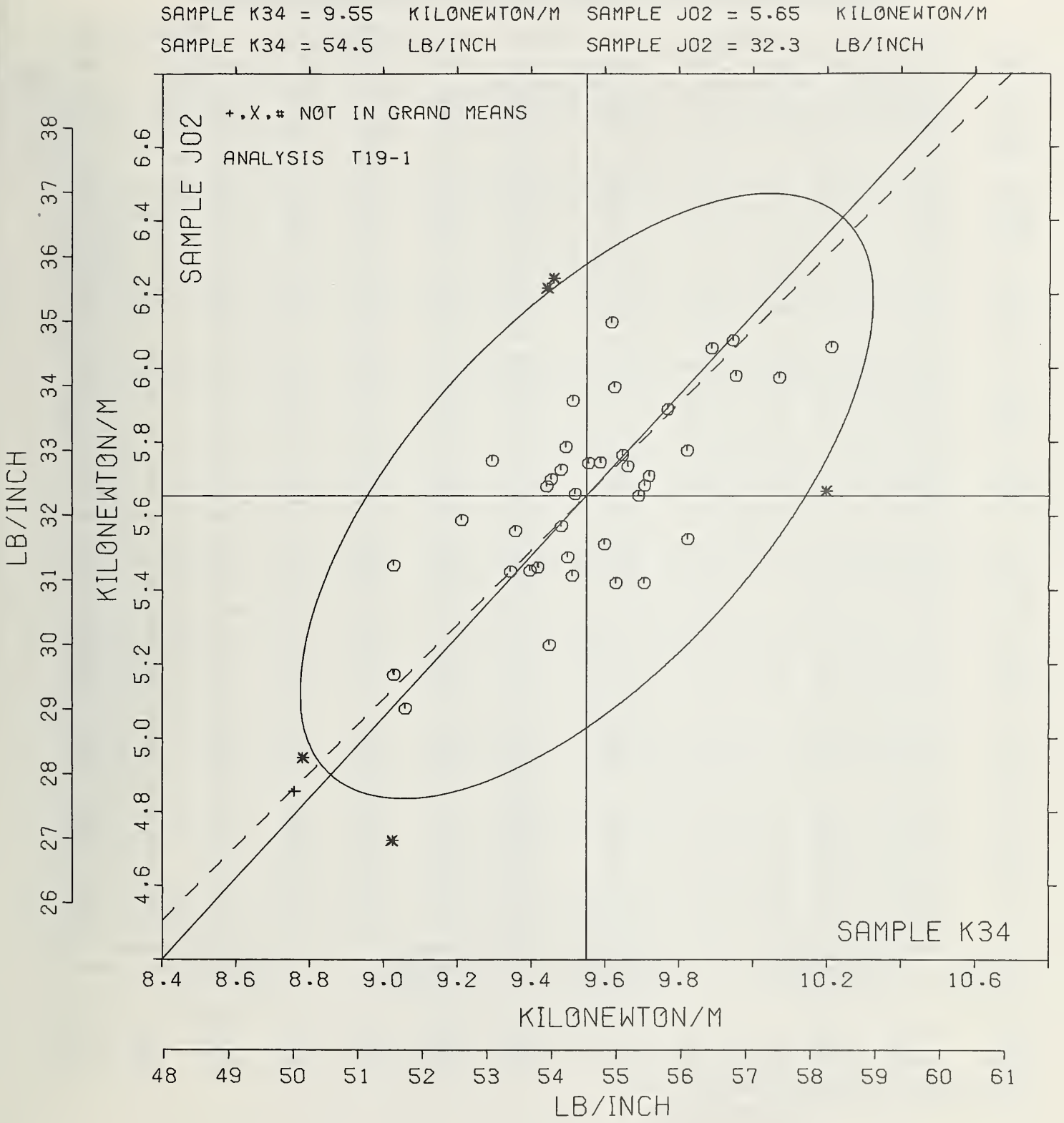
The following laboratories were omitted from the grand means because of extreme test results: 568, 662.

Data from the following laboratories appear to be off by a multiplicative factor: 167.

ANALYSIS T19-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PACKAGING PAPERS
TAPPI OFFICIAL TEST METHODS T404 OS-76 AND T494 OS-70, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS E34	MEANS J02	COORDINATES MAJOR	COORDINATES MINOR	AVG ERROR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L251	*	8.08	4.56	-1.30	.34	1.23 19I	TENSILE STRENGTH, 31 TO 74 LB/IN, CRE, 20C, 65% RH
L568	#	8.21	5.20	-1.24	.08	1.05 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L250I	*	8.76	4.86	-1.12	.04	.45 19L	TENSILE STRENGTH, 31 TO 74 LB/IN, CRE, 20 C, 65% RH
L318	*	8.78	4.95	-1.04	.09	.83 19G	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L604	*	9.03	4.72	-1.04	-.24	1.09 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L157I	G	9.03	5.47	-.49	.26	.95 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L280	G	9.03	5.17	-.71	.00	1.08 19G	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L267	G	9.06	5.08	-.75	-.03	.82 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L348	G	9.21	5.59	-.26	.20	.83 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L264A	G	9.30	5.75	-.10	.25	.80 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L650	G	9.34	5.45	-.29	.01	1.00 19G	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L610	G	9.36	5.56	-.20	.08	.73 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L217P	G	9.40	5.45	-.25	-.02	.95 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L182I	G	9.42	5.46	-.23	-.04	.89 19D	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L106	G	9.44	5.68	-.05	.10	1.01 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L565	*	9.44	6.22	.34	.46	.71 19T	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L151	G	9.45	5.25	-.36	-.20	1.05 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L265	G	9.46	5.70	-.03	.10	.93 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L237A	*	9.46	6.24	.38	.46	.90 19Q	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L237B	G	9.48	5.72	.01	.10	1.21 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L182L	G	9.48	5.57	-.11	-.01	.86 19T	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L312	G	9.50	5.79	.06	.13	1.02 19D	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L684	G	9.50	5.49	-.16	-.08	1.37 19W	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L581	G	9.51	5.44	-.18	-.12	.84 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L305	G	9.51	5.91	.17	.20	.83 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L575	G	9.52	5.66	-.02	.02	.76 19G	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L576	G	9.56	5.74	.07	.05	.82 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L278	G	9.59	5.75	.09	.03	.86 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L207	G	9.60	5.52	-.06	-.13	.98 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L264P	G	9.62	6.12	.39	.27	.93 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L157A	G	9.63	5.95	.27	.14	.91 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L689	G	9.63	5.42	-.12	-.22	.75 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L652	G	9.65	5.77	.15	.00	1.00 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L273	G	9.66	5.73	.13	-.03	1.14 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L606	G	9.69	5.66	.10	-.10	.73 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L356	G	9.71	5.42	-.07	-.28	1.23 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L217A	G	9.71	5.68	.13	-.10	.77 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L281	G	9.72	5.71	.16	-.09	.85 19G	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L580	G	9.77	5.89	.32	-.00	.84 19G	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L562	G	9.82	5.78	.26	-.12	2.15 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L324	G	9.82	5.54	.10	-.28	.99 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L554	G	9.89	6.05	.52	.02	1.07 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L225	G	9.95	6.08	.56	-.01	.90 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L107	G	9.95	5.98	.51	-.08	1.00 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L334	G	10.07	5.97	.59	-.17	.86 19P	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L676	*	10.20	5.67	.43	-.47	2.68 19A	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L219	G	10.21	6.06	.74	-.22	.84 19E	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
L662	#	10.93	6.32	1.42	-.57	1.14 19G	TENSILE STRENGTH, 31 TO 74 LB/IN, PENDULUM TESTER
L167	#	61.19	35.02	36.35	-18.22	4.54 19G	TENSILE STRENGTH, 31 TO 74 LB/IN, LOAD CELL (CRE)
GMEANS:		9.55	5.65			1.00	
		95% ELLIPSE:		1.02	.48	WITH GAMMA = 47 DEGREES	


TENSILE STRENGTH, PACKAGING PAPERS
SAMPLE K34 = 9.55 KILONEWTON/M
SAMPLE K34 = 54.5 LB/INCH
SAMPLE J02 = 5.65 KILONEWTON/M
SAMPLE J02 = 32.3 LB/INCH
+.X.* NOT IN GRAND MEANS
ANALYSIS T19-1
SAMPLE J02
KILONEWTON/M
LB/INCH
SAMPLE K34
KILONEWTON/M
LB/INCH

ANALYSIS T20-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PRINTING PAPERS

TAPPI OFFICIAL TEST METHOD T494 OS-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	SAMPLE G08 MEAN	WRITING 61 GRAMS PER SQUARE METER DEV	NO. DEV	SDR	R. SDR	SAMPLE J72 MEAN	PRINTING 76 GRAMS PER SQUARE METER DEV	NO. DEV	SDR	R. SDR	TEST D. = 20 VAR	F	LAB
L105	3.118	-.101	-.32	.158	1.12	3.342	-.285	-1.37	.232	1.51	20A	@	L105
L115	3.350	.131	.08	.090	.66	4.013	.387	1.87	.093	.60	20D	@	L115
L118	3.229	.010	.03	.106	.75	3.725	.099	.48	.084	.55	20A	@	L118
L124C	3.070	-.149	-.77	.157	1.12	3.515	-.112	-.54	.171	1.11	20A	@	L124C
L125	3.264	.045	.24	.221	1.56	3.607	.180	.87	.166	1.08	20C	@	L125
L131	3.215	-.004	-.02	.161	1.14	3.595	-.031	-.15	.215	1.40	20E	@	L131
L141T	3.272	.053	.28	.186	1.33	3.721	.094	.45	.145	.94	20A	@	L141T
L143	3.530	.311	1.61	.134	.95	3.914	.287	1.39	.177	1.15	20E	@	L143
L148	3.302	.083	.43	.107	.76	3.787	.160	.77	.182	1.18	20A	@	L148
L159	3.300	.081	.42	.142	1.01	3.667	.041	.20	.129	.84	20A	@	L159
L163	3.286	.067	.35	.141	1.00	3.777	.150	.73	.100	.65	20D	@	L163
L167	3.770	.551	2.85	.163	1.15	4.070	.443	2.14	.103	.67	20G	*	L167
L176	2.946	-.273	-1.41	.203	1.87	3.255	-.371	-1.79	.269	1.75	20G	@	L176
L185	3.368	.149	.77	.128	.91	3.792	.166	.80	.127	.82	20C	@	L185
L190R	3.133	-.086	-.44	.160	1.13	3.233	-.393	-1.90	.181	1.17	20A	@	L190R
L194	3.118	-.101	-.52	.092	.65	3.519	-.108	-.52	.147	.95	20A	@	L194
L211	2.636	-.583	-3.02	.318	2.26	3.116	-.510	-2.46	.407	2.64	20C	*	L211
L223B	3.215	-.004	-.02	.119	.85	3.746	.120	.58	.125	.81	20A	@	L223B
L226C	3.345	.126	.65	.130	.92	3.345	-.282	-1.36	.253	1.64	20C	*	L226C
L230	3.023	-.196	-1.02	.097	.69	3.521	-.106	-.51	.105	.68	20G	@	L230
L260	3.037	-.182	-.94	.101	.71	3.379	-.248	-1.20	.195	1.26	20A	@	L260
L261	3.560	.341	1.76	.109	.77	4.033	.406	1.96	.277	1.80	20A	@	L261
L291	2.959	-.260	-1.35	.202	1.43	3.518	-.109	-.53	.169	1.10	20A	@	L291
L309	3.325	.106	.55	.113	.80	3.750	.123	.59	.165	1.07	20E	@	L309
L315	3.135	-.084	-.43	.150	1.07	3.586	-.041	-.20	.159	1.03	20A	@	L315
L318	2.910	-.309	-1.60	.090	.64	3.426	-.201	-.97	.075	.48	20G	@	L318
L325	3.109	-.110	-.57	.151	1.07	3.697	.071	.34	.117	.76	20E	@	L325
L328	3.370	.151	.78	.101	.71	3.780	.153	.74	.127	.82	20A	@	L328
L333	3.295	.076	.40	.119	.84	3.684	.057	.28	.211	1.37	20A	@	L333
L344	3.121	-.098	-.51	.245	1.74	3.646	.020	.10	.323	2.10	20A	@	L344
L356	3.196	-.023	-.12	.124	.88	3.637	.010	.05	.168	1.09	20A	@	L356
L360	3.108	-.111	-.57	.105	.74	3.474	-.153	-.74	.144	.93	20B	@	L360
L376	2.951	-.268	-1.39	.335	2.38	3.639	.012	.06	.111	.72	20A	@	L376
L386	3.276	.057	.29	.124	.88	3.661	.035	.17	.108	.70	20E	@	L386
L390	3.211	-.008	-.04	.180	1.28	3.738	.112	.54	.166	1.08	20A	@	L390
L442	3.225	.006	.03	.112	.79	3.615	-.012	-.06	.075	.48	20G	@	L442
L557	3.132	-.087	-.45	.137	.97	3.501	-.126	-.61	.078	.51	20A	@	L557
L563	3.386	.167	.86	.170	1.21	3.656	.029	.14	.160	1.04	20A	@	L563
L567	3.119	-.100	-.52	.101	.71	3.523	-.104	-.50	.117	.76	20A	@	L567
L574	3.410	.191	.99	.072	.51	3.752	.125	.60	.134	.87	20A	@	L574
L575	3.240	.021	.11	.119	.84	3.725	.098	.47	.125	.81	20G	@	L575
L587	3.318	.099	.51	.101	.72	3.566	-.061	-.29	.204	1.32	20A	@	L587
L592	3.527	.308	1.59	.101	.71	3.643	.216	1.04	.106	.69	20A	@	L592
L616	.190	-3.029	-15.69	.015	.11	.201	-3.426	-16.53	.018	.12	20D	#	L616
L618	3.264	.045	.23	.254	1.80	3.312	-.315	-1.52	.182	1.18	20A	*	L618
L692	15.691	12.472	64.58	.696	4.89	17.814	14.187	68.48	.701	4.55	20A	#	L692
L698	3.181	-.038	-.20	.150	1.06	3.599	-.028	-.14	.161	1.04	20E	@	L698

GR. MEAN = 3.219 KILONEWTON/M GRAND MEAN = 3.627 KILONEWTON/M TEST DETERMINATIONS = 20

SD MEANS = .193 KILONEWTON/M SD OF MEANS = .207 KILONEWTON/M 45 LABS IN GRAND MEANS

AVERAGE SDR = .141 KILONEWTON/M AVERAGE SDR = .154 KILONEWTON/M

GR. MEAN =10.857 LB/15 MM GRAND MEAN =12.232 LB/15 MM

L139	3.231	.012	.06	.124	.88	3.699	.072	.35	.146	.95	20H	+	L139
L250I	2.831	-.388	-2.01	.187	1.19	3.323	-.304	-1.47	.062	.40	20L	+	L250I
L251	2.500	-.719	-3.72	.210	1.53	2.999	-.627	-3.03	.289	1.87	20I	+	L251
L705	18.950	15.731	81.48	1.980	14.04	20.600	16.973	81.93	1.896	12.30	20X	+	L705

TOTAL NUMBER OF LABORATORIES REPORTING = 51

Best values: G08 3.2 ± 0.3 kilonewton per meter

J72 3.6 ± 0.3 kilonewton per meter

Data from the following laboratories appear to be off by a multiplicative factor: 616, 692.

ANALYSIS T20-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PRINTING PAPERS

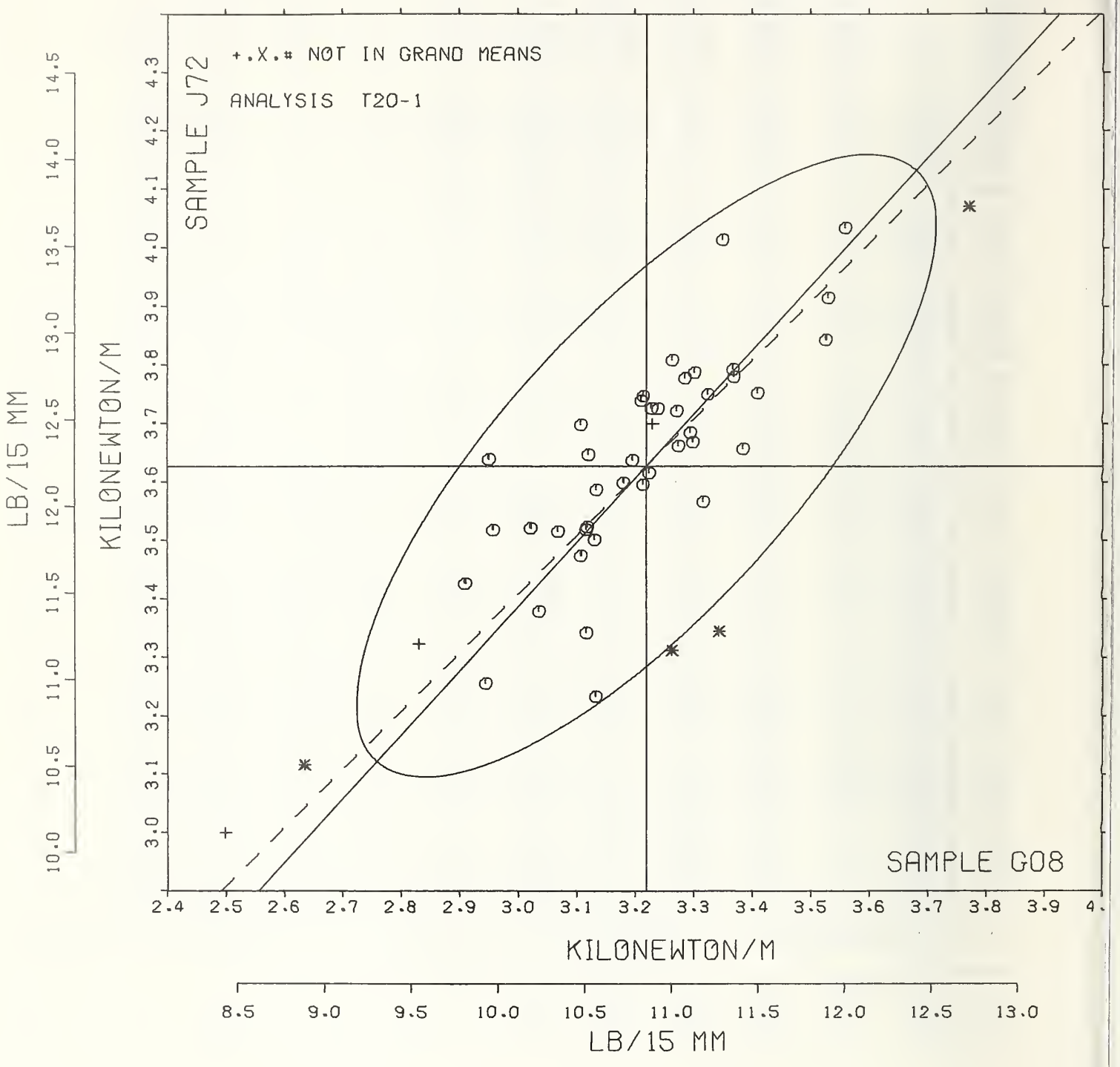
TAPPI OFFICIAL TEST METHOD T494 OS-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	F	MEANS G08	MEANS J72	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L616	#	.190	.201	-4.572	-.071	.41	20D	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L251	*	2.500	2.999	-.948	.109	1.70	20I	TENSILE STRENGTH, 14 TO 40 LB/IN, CRE, 20 C, 65% RH
L211	*	2.636	3.116	-.770	.087	2.43	20C	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L250I	*	2.831	3.323	-.486	.082	.60	20L	TENSILE STRENGTH, 14 TO 40 LB/IN, CRE, 20 C, 65% RH
L318	@	2.910	3.426	-.356	.093	.56	20G	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L176	@	2.946	3.255	-.458	-.048	1.61	20G	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L376	@	2.951	3.639	-.172	.206	1.05	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L291	@	2.959	3.518	-.236	.119	1.26	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L230	@	3.023	3.521	-.211	.074	.08	20B	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L260	@	3.037	3.379	-.306	-.033	.99	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L124C	@	3.070	3.515	-.183	.035	1.11	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L360	@	3.108	3.474	-.188	-.021	.84	20J	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L325	@	3.109	3.697	-.022	.129	.91	20E	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L105	@	3.118	3.342	-.279	-.117	1.31	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L194	@	3.118	3.519	-.148	.002	.60	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L567	@	3.119	3.523	-.144	.004	.74	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L344	@	3.121	3.646	-.051	.086	1.92	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L557	@	3.132	3.501	-.152	-.020	.74	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L190R	@	3.133	3.233	-.348	-.202	1.15	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L315	@	3.135	3.586	-.086	.035	1.05	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L698	@	3.181	3.599	-.047	.009	1.03	20E	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L356	@	3.196	3.637	-.008	.024	.98	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L390	@	3.211	3.738	.077	.061	1.18	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L131	@	3.215	3.595	-.026	-.018	1.07	20E	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L223B	@	3.215	3.746	.086	.064	.63	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L442	@	3.225	3.615	-.005	-.012	.64	20G	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L118	@	3.229	3.725	.080	.059	.65	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L139	*	3.231	3.699	.061	.040	.92	20H	TENSILE STRENGTH, 14 TO 40 LB/IN, CRE, SHORT TEST SPAN
L575	@	3.240	3.725	.087	.051	.63	20G	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L618	*	3.264	3.312	-.202	-.245	1.49	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L125	@	3.264	3.807	.164	.088	1.02	20C	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L141T	@	3.272	3.721	.106	.024	1.13	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L386	@	3.276	3.661	.064	-.018	.79	20E	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L163	@	3.286	3.777	.156	.052	.62	20D	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L333	@	3.295	3.684	.094	-.018	1.11	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L159	@	3.300	3.667	.064	-.032	.92	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L148	@	3.302	3.787	.174	.046	.97	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L587	@	3.318	3.566	.022	-.114	1.02	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L309	@	3.325	3.750	.162	.004	.94	20E	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L226C	*	3.345	3.345	-.124	-.283	1.28	20C	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L115	@	3.350	4.013	.374	.164	.64	20D	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L185	@	3.368	3.792	.223	.001	.87	20C	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L328	@	3.370	3.780	.215	-.008	.77	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L563	@	3.386	3.656	.134	-.103	1.12	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L574	@	3.410	3.752	.221	-.037	.89	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L592	@	3.527	3.843	.307	-.062	.76	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L143	@	3.530	3.914	.422	-.036	1.05	20E	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L261	@	3.560	4.033	.530	.022	1.26	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L167	*	3.770	4.070	.699	-.108	.91	20G	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L692	#	15.691	17.814	18.886	.347	4.72	20A	TENSILE STRENGTH, 14 TO 40 LB/IN, LOAD CELL (CRE)
L705	*	18.950	20.600	23.141	-.183	13.17	20X	TENSILE STRENGTH, 14 TO 40 LB/IN: ( )PENDULUM,( )LOAD CELL
GMEANS:		3.219	3.627			1.00		
		95% ELLIPSE:		.063	.248	WITH GAMMA = 47 DEGREES		

TENSILE STR., CRE, PRINTING PAPERS

SAMPLE G08 = 3.22 KILONEWTON/M SAMPLE J72 = 3.63 KILONEWTON/M

SAMPLE G08 = 10.86 LB/15 MM SAMPLE J72 = 12.23 LB/15 MM



ANALYSIS T20-2 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PRINTING PAPERS

TAPPI OFFICIAL TEST METHOD T404 OS-76, PENDULUM-TYPE TESTER

LAB	SAMPLE G08 WRITING 61 GRAMS PER SQUARE METER					SAMPLE J72 PRINTING 76 GRAMS PER SQUARE METER					TEST D_o = 20		
CODE	MEAN	DEV	N_o DEV	SDR	R_o SDR	MEAN	DEV	N_o DEV	SDR	R_o SDR	VAR	F	LAB
L108	3.39	.13	.83	.11	.76	3.78	.11	.65	.13	.73	20P	6	L108
L121	3.21	-.04	-.21	.15	1.01	3.61	-.07	-.43	.14	.79	20P	6	L121
L124P	3.11	-.15	-.71	.16	1.11	3.64	-.04	-.23	.22	1.22	20P	6	L124P
L128	3.19	-.07	-.34	.14	.96	3.70	.02	.15	.15	.82	20T	6	L128
L148	3.23	-.03	-.15	.10	.65	3.62	-.06	-.34	.19	1.04	20P	6	L148
L153	3.31	.05	.20	.18	1.21	3.77	.10	.60	.18	.98	20P	6	L153
L162	2.97	-.29	-1.40	.20	1.35	3.60	-.08	-.48	.26	1.45	20V	6	L162
L182L	3.08	-.18	-.86	.12	.82	3.63	-.04	-.27	.12	.65	20T	6	L182L
L183	3.15	-.11	-.52	.18	1.19	3.71	.03	.20	.17	.95	20P	6	L183
L189	3.53	.28	1.34	.17	1.13	3.94	.26	1.63	.13	.74	20R	6	L189
L191P	3.54	.28	1.35	.10	.65	3.70	.03	.17	.29	1.58	20P	6	L191P
L195	3.03	-.23	-1.10	.19	1.30	3.61	-.07	-.41	.27	1.50	20R	6	L195
L212	2.75	-.50	-2.44	.17	1.16	3.34	-.34	-2.11	.28	1.56	20R	6	L212
L213	3.18	-.08	-.37	.18	1.19	3.48	-.19	-1.21	.18	1.02	20T	6	L213
L218	3.26	.00	.00	.07	.44	3.55	-.13	-.81	.08	.43	20P	6	L218
L233	3.40	.15	.70	.15	1.01	3.76	.08	.50	.15	.85	20Q	6	L233
L234	3.25	-.01	-.04	.13	.86	3.63	-.05	-.30	.09	.50	20P	6	L234
L241	3.22	-.03	-.16	.17	1.17	3.66	-.02	-.12	.17	.96	20R	6	L241
L242	2.94	-.32	-1.55	.13	.86	3.47	-.21	-1.29	.14	.80	20Y	6	L242
L249	3.32	.06	.29	.12	.83	3.83	.15	.95	.18	1.02	20P	6	L249
L259	3.17	-.08	-.40	.12	.83	3.66	-.01	-.08	.15	.82	20P	6	L259
L262	3.40	.14	.70	.11	.74	3.90	.22	1.40	.12	.69	20R	6	L262
L275	2.95	-.31	-1.48	.25	1.68	3.44	-.24	-1.48	.22	1.21	20R	6	L275
L279P	3.74	.48	2.33	.29	1.92	4.06	.38	2.37	.14	.79	20P	6	L279P
L285	3.29	.03	.15	.12	.78	3.50	-.18	-1.11	.17	.92	20P	6	L285
L290	2.93	-.33	-1.59	.08	.57	3.35	-.32	-2.02	.15	.82	20P	6	L290
L311	3.27	.02	.09	.13	.85	3.82	.14	.89	.16	.88	20V	6	L311
L313	3.22	-.04	-.20	.11	.73	3.67	-.01	-.03	.11	.60	20T	6	L313
L330	3.46	.20	.96	.21	1.41	3.71	.03	.20	.27	1.49	20P	6	L330
L337	3.47	.22	1.05	.24	1.58	3.96	.29	1.80	.31	1.72	20V	6	L337
L356	3.19	-.07	-.33	.20	1.37	3.64	-.03	-.21	.25	1.41	20P	6	L356
L366	3.45	.19	.91	.17	1.12	3.57	-.11	-.67	.25	1.39	20P	6	L366
L393	3.35	.09	.43	.09	.60	3.81	.13	.83	.16	.86	20P	6	L393
L484	3.00	-.26	-1.27	.12	.82	3.61	-.06	-.39	.20	1.08	20U	6	L484
L556	3.51	.25	1.23	.09	.59	3.94	.27	1.66	.18	.97	20P	6	L556
L571	3.55	.29	1.42	.22	1.50	3.75	.07	.44	.24	1.32	20P	6	L571
L599	3.38	.12	.60	.18	1.19	3.46	-.22	-1.34	.20	1.08	20V	*	L599
L626	3.39	.14	.68	.11	.74	3.67	-.01	-.04	.13	.71	20T	6	L626
L680	3.42	.16	.80	.12	.79	3.85	.15	.95	.16	.90	20R	6	L680
L685	3.03	-.22	-1.08	.14	.93	3.67	-.00	-.02	.14	.78	20Y	6	L685
L714	3.30	.04	.20	.12	.81	3.67	-.00	-.02	.19	1.04	20P	6	L714

GR_o MEAN = 3.26 KILONEWTON/M GRAND MEAN = 3.68 KILONEWTON/M TEST DETERMINATIONS = 20

SD MEANS = .21 KILONEWTON/M SD OF MEANS = .16 KILONEWTON/M 41 LABS IN GRAND MEANS

AVERAGE SDR = .15 KILONEWTON/M AVERAGE SDR = .18 KILONEWTON/M

GR_o MEAN = 10.984 LB/15 MM GRAND MEAN = 12.398 LB/15 MM

TOTAL NUMBER OF LABORATORIES REPORTING = 41

Best values: G08 3.3 $\pm$ 0.4 kilonewton per meter

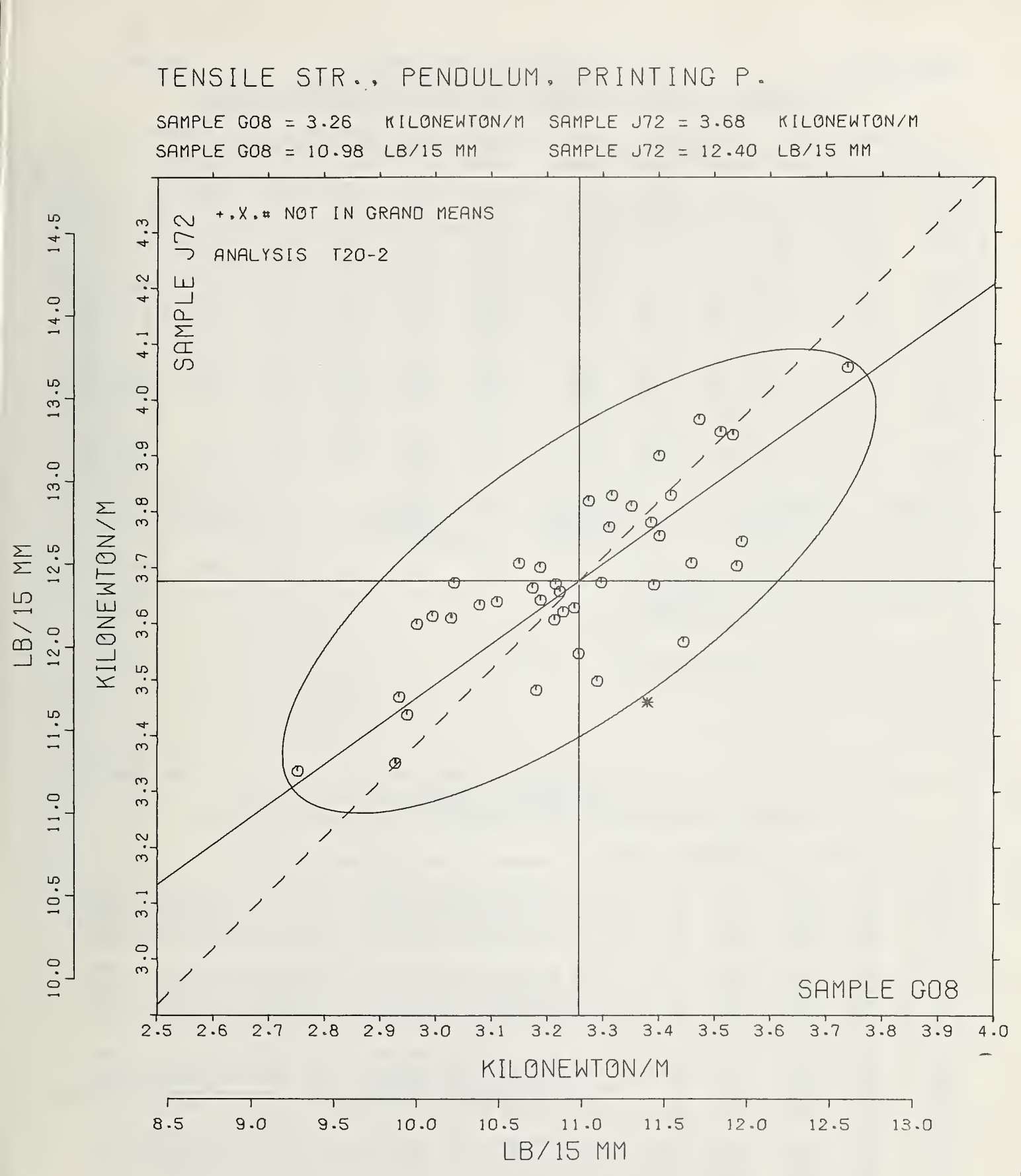
J72 3.7 $\pm$ 0.3 kilonewton per meter

ANALYSIS T20-2 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PRINTING PAPERS

TAPPI OFFICIAL TEST METHOD T404 OS-76, PENDULUM-TYPE TESTER

LAB CODE	F	MEANS G08	MEANS J72	COORDINATES MAJOR	COORDINATES MINOR	AVG SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L212	6	2.75	3.34	-.61	.02	1.36	20R	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L290	6	2.93	3.35	-.46	-.07	.69	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L242	6	2.94	3.47	-.38	.02	.63	20Y	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L275	6	2.95	3.44	-.39	-.02	1.45	20R	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L162	6	2.97	3.60	-.28	.11	1.40	20V	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L484	6	3.00	3.61	-.25	.10	.95	20U	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L195	6	3.03	3.61	-.22	.08	1.40	20R	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L685	6	3.03	3.67	-.18	.13	.85	20Y	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L182L	6	3.08	3.63	-.17	.07	.73	20T	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L124P	6	3.11	3.64	-.14	.05	1.16	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L183	6	3.15	3.71	-.07	.09	1.07	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L259	6	3.17	3.66	-.07	.04	.83	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L213	6	3.18	3.48	-.17	-.11	1.41	20T	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L128	6	3.19	3.70	-.04	.06	.89	20T	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L356	6	3.19	3.64	-.08	.01	1.39	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L121	6	3.21	3.61	-.08	-.03	.96	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L313	6	3.22	3.67	-.04	.02	.86	20T	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L241	6	3.22	3.66	-.04	.00	1.07	20R	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L148	6	3.23	3.62	-.05	-.03	.84	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L234	6	3.25	3.63	-.03	-.03	.88	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L218	6	3.26	3.55	-.08	-.11	.44	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L311	6	3.27	3.82	.10	.11	.87	20V	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L285	6	3.29	3.50	-.06	-.16	.85	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L714	6	3.30	3.67	.03	-.03	.92	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L153	6	3.31	3.77	.10	.05	1.10	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L249	6	3.32	3.83	.14	.09	.92	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L393	6	3.35	3.81	.10	.05	.73	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L599	*	3.38	3.46	-.03	-.25	1.14	20V	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L108	6	3.39	3.78	.17	.01	.74	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L626	6	3.39	3.67	.11	-.08	.73	20T	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L262	6	3.40	3.90	.25	.10	.71	20R	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L233	6	3.40	3.76	.17	-.02	.95	20Q	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L680	6	3.42	3.83	.22	.03	.85	20R	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L366	6	3.45	3.57	.09	-.20	1.25	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L330	6	3.46	3.71	.16	-.09	1.45	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L337	6	3.47	3.96	.34	.11	1.65	20V	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L556	6	3.51	3.94	.36	.07	.78	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L189	6	3.53	3.94	.38	.05	.93	20R	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L191P	6	3.54	3.70	.25	-.14	1.12	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L571	6	3.55	3.75	.28	-.11	1.41	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
L279P	6	3.74	4.06	.01	.03	1.35	20P	TENSILE STRENGTH, 14 TO 40 LB/IN, PENDULUM TESTER
GMEANS:		3.20	3.68			1.00		
		95% ELLIPSE:		.03	.23	WITH GAMMA = 35 DEGREES		


TENSILE STR., PENDULUM, PRINTING P.
SAMPLE G08 = 3.26 KILONEWTON/M SAMPLE J72 = 3.68 KILONEWTON/M
SAMPLE G08 = 10.98 LB/15 MM SAMPLE J72 = 12.40 LB/15 MM
+,X,* NOT IN GRAND MEANS
ANALYSIS T20-2
SAMPLE J72
KILONEWTON/M
LB/15 MM
SAMPLE G08
KILONEWTON/M
LB/15 MM

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ANALYSIS T25-1 TABLE 1

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER

TAPPI OFFICIAL TEST METHOD T494 OS-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	SAMPLE K34 KRAFT 123 GRAMS PER SQUARE METER MEAN	DEV	NO.DEV	SDR	R.SDR	SAMPLE J02 BLEACHED 98 GRAMS PER SQUARE METER MEAN	DEV	NO.DEV	SDR	R.SDR	TEST Dc = 20 VAR	F	LAB
L106	105.6	9.7	1.04	10.5	.79	80.2	5.9	.78	9.8	1.06	25F	6	L106
L151	96.4	.4	.00	17.1	1.29	73.9	-6.4	-.85	8.1	.87	25F	6	L151
L182	92.4	-3.5	-.39	10.9	.83	77.9	-2.5	-.33	6.7	.72	25B	6	L182
L207	103.6	7.7	1.30	11.3	.86	79.7	-.7	-.09	11.4	1.22	25F	6	L207
L219	101.7	5.8	.97	10.4	.79	90.2	9.9	1.30	7.4	.80	25J	6	L219
L234	104.8	8.9	1.49	13.3	1.01	88.9	8.6	1.13	7.5	.81	25F	6	L234
L237B	89.8	-6.1	-1.03	12.7	.96	74.6	-5.8	-.76	10.8	1.16	25H	6	L237B
L264	90.4	-5.5	-.93	10.1	.77	75.8	-4.5	-.60	5.8	.62	25F	6	L264
L267	100.6	4.7	.79	13.0	1.03	75.4	-5.0	-.66	6.4	.69	25F	6	L267
L273	93.8	2.9	.50	10.7	1.27	88.7	8.4	1.11	11.2	1.21	25G	6	L273
L278	94.7	-1.2	-.20	14.0	1.06	85.9	5.5	.73	8.4	.90	25E	6	L278
L280	98.4	2.5	.43	12.3	.93	77.3	-3.0	-.40	16.5	1.77	25B	6	L280
L312	94.1	-1.8	-.30	17.3	1.31	91.5	11.2	1.47	10.5	1.13	25J	6	L312
L318	90.2	-5.7	-.95	13.6	1.05	80.4	.0	.00	6.6	.71	25A	6	L318
L580	87.2	-8.7	-1.47	12.7	.96	81.0	.7	.09	5.2	.56	25C	6	L580
L604	82.1	-13.8	-2.32	14.0	1.12	131.1	50.8	6.70	31.8	3.42	25A	#	L604
L676	87.9	-8.0	-1.35	18.7	1.42	62.0	-18.3	-2.42	16.1	1.73	25F	6	L676
L689	93.7	-2.2	-.35	9.0	.66	76.4	-4.0	-.52	9.7	1.04	25F	6	L689

GR. MEAN = 95.9 JOULES/SQ M — GRAND MEAN = 80.3 JOULES/SQ M — TEST DETERMINATIONS = 20

SD MEANS = 5.9 JOULES/SQ M — SD OF MEANS = 7.6 JOULES/SQ M — 17 LABS IN GRAND MEANS

AVERAGE SDR = 13.2 JOULES/SQ M — AVERAGE SDR = 9.3 JOULES/SQ M

GR. MEAN = 6.569 FT.LB/SQ FT — GRAND MEAN = 5.503 FT.LB/SQ FT

L250	99.5	3.0	.01	.01	.46	81.2	.8	.11	3.4	.36	25N	*	L250

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: K34 95 ± 8 joules per square meter
J02 80 ± 13 joules per square meter

The following laboratories were omitted from the grand means because of extreme test results: 604.

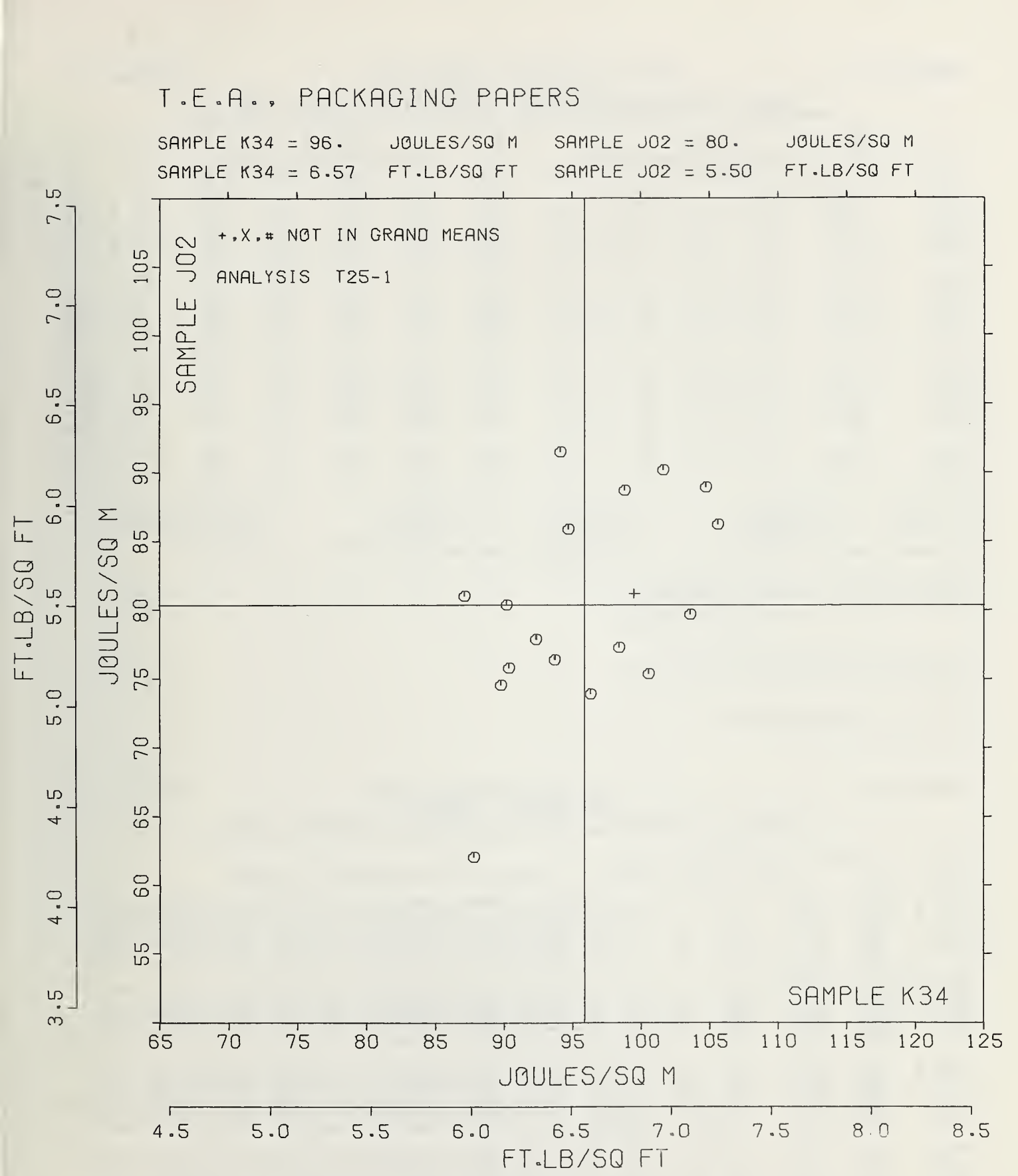
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ANALYSIS T25-1 TABLE 2

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER

TAPPI OFFICIAL TEST METHOD T494 OS-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	F	MEANS K34	J02	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L604	#	82.1	131.1	35.0	38.7	2.47	25A	TENSILE ENERGY ABSORPTION (WITH TEST T19),FLAT/FLAT JAWS
L580	6	87.2	81.0	-4.1	7.7	.79	25C	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/LINE JAWS
L676	6	87.9	62.0	-19.8	-3.0	1.37	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L237B	6	89.8	74.6	-8.1	2.1	1.06	25H	TENSILE ENERGY ABSORPTION (WITH TEST T19),2-PIN STRAIN GAGE
L318	6	90.2	80.4	-3.0	4.8	.98	25A	TENSILE ENERGY ABSORPTION (WITH TEST T19),FLAT/FLAT JAWS
L264	6	90.4	75.8	-.8	2.3	.89	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L182	6	92.4	77.9	-4.0	1.7	.77	25B	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L689	6	93.7	76.4	-4.3	-.3	.88	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L312	6	94.1	91.5	8.5	7.4	1.22	25J	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L278	6	94.7	85.9	4.1	3.9	.98	25E	TENSILE ENERGY ABSORPTION (WITH TEST T19),FLAT/FLAT JAWS
L151	6	96.4	73.9	-5.2	-3.8	1.08	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L280	6	98.4	77.3	-1.2	-3.8	1.33	25B	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L273	6	98.8	88.7	8.7	2.0	1.24	25G	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/LINE JAWS
L250	*	99.5	81.2	2.7	-2.6	.41	25N	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS,23C
L267	6	100.6	75.4	-1.7	-6.0	.86	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L219	6	101.7	90.2	11.4	.4	.79	25J	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L207	6	103.6	79.7	3.6	-6.9	1.04	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L234	6	104.8	88.9	12.0	-2.9	.91	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
L106	6	105.6	86.2	10.2	-5.1	.95	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),LINE/FLAT JAWS
GMEANS:		95.9	80.3			1.00		
		95% ELLIPSE:		23.8	14.8	WITH GAMMA = 57 DEGREES		


T.E.A., PACKAGING PAPERS
SAMPLE K34 = 96. JOULES/SQ M
SAMPLE K34 = 6.57 FT.LB/SQ FT
SAMPLE J02 = 80. JOULES/SQ M
SAMPLE J02 = 5.50 FT.LB/SQ FT
+,X,# NOT IN GRAND MEANS
ANALYSIS T25-1
SAMPLE J02
SAMPLE K34
JOULES/SQ M
FT.LB/SQ FT

ANALYSIS T26-1 TABLE 1

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER

TAPPI OFFICIAL TEST METHOD T494 OS-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB	SAMPLE	WRITING				SAMPLE	PRINTING				TEST D_0 = 20		
	G08	61 GRAMS PER SQUARE METER				J72	76 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N_0 DEV	SDR	R_0 SDR	MEAN	DEV	N_0 DEV	SDR	R_0 SDR	VAR	F	LAB
L115	33.3	-.3	-.29	2.4	.07	45.6	4.8	1.84	3.3	.75	26C	@	L115
L118	31.9	-1.7	-1.06	3.0	.84	39.7	-1.1	-.44	3.8	.87	26E	@	L118
L139	34.8	1.1	.71	4.9	1.37	41.4	.6	.24	5.3	1.21	26H	@	L139
L159	34.1	.4	.28	3.9	1.08	40.3	-.6	-.21	5.2	1.18	26F	@	L159
L163	33.0	-.7	-.42	4.1	1.14	43.3	2.5	.95	3.6	.83	26J	@	L163
L167	37.7	4.0	2.54	1.0	.45	40.7	-.1	-.05	1.0	.24	26D	@	L167
L185	31.0	-2.7	-1.07	5.4	1.41	39.0	-1.8	-.71	3.7	.85	26C	@	L185
L211	35.4	1.7	1.10	4.3	1.20	41.5	.7	.26	4.9	1.12	26Z	@	L211
L309	39.6	6.0	3.75	7.3	2.03	50.6	15.8	6.11	8.9	2.04	26J	#	L309
L318	33.7	.0	.01	3.9	1.07	44.8	4.0	1.53	5.5	1.25	26A	@	L318
L356	33.8	.2	.10	3.7	1.03	41.2	.3	.13	5.7	1.30	26A	@	L356
L393	32.6	-1.1	-.00	2.9	.81	36.0	-2.8	-1.08	4.0	.91	26V	@	L393
L442	38.3	4.7	2.93	2.5	.71	1.8	-39.0	-15.06	.1	.01	26B	#	L442
L563	41.3	7.0	4.00	0.0	1.84	52.9	12.1	4.67	12.8	2.92	26C	#	L563
L567	32.1	-1.5	-.97	3.7	1.04	38.5	-2.3	-.89	3.9	.89	26A	@	L567
L575	33.2	-.4	-.26	3.0	.99	43.4	2.6	1.01	4.7	1.08	26A	@	L575
L587	34.1	.5	.30	3.3	.97	36.8	-4.0	-1.56	7.2	1.64	26C	@	L587
L592	34.1	.4	.25	3.4	.93	38.2	-2.7	-1.03	3.9	.89	26H	@	L592

GR$_0$ MEAN = 33.7 JOULES/SQ M — GRAND MEAN = 40.8 JOULES/SQ M — TEST DETERMINATIONS = 20

SD MEANS = 1.6 JOULES/SQ M — SD OF MEANS = 2.6 JOULES/SQ M — 15 LABS IN GRAND MEANS

AVERAGE SDR = 3.0 JOULES/SQ M — AVERAGE SDR = 4.4 JOULES/SQ M

GR$_0$ MEAN = 2.306 FT.LB/SQ FT — GRAND MEAN = 2.796 FT.LB/SQ FT

L250	34.4	.8	.48	3.0	1.00	46.9	6.1	2.36	2.6	.59	26N	* L250

TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: G08 34 ± 2 joules per square meter

J72 41 ± 4 joules per square meter

The following laboratories were omitted from the grand means because of extreme test results: 309, 442.

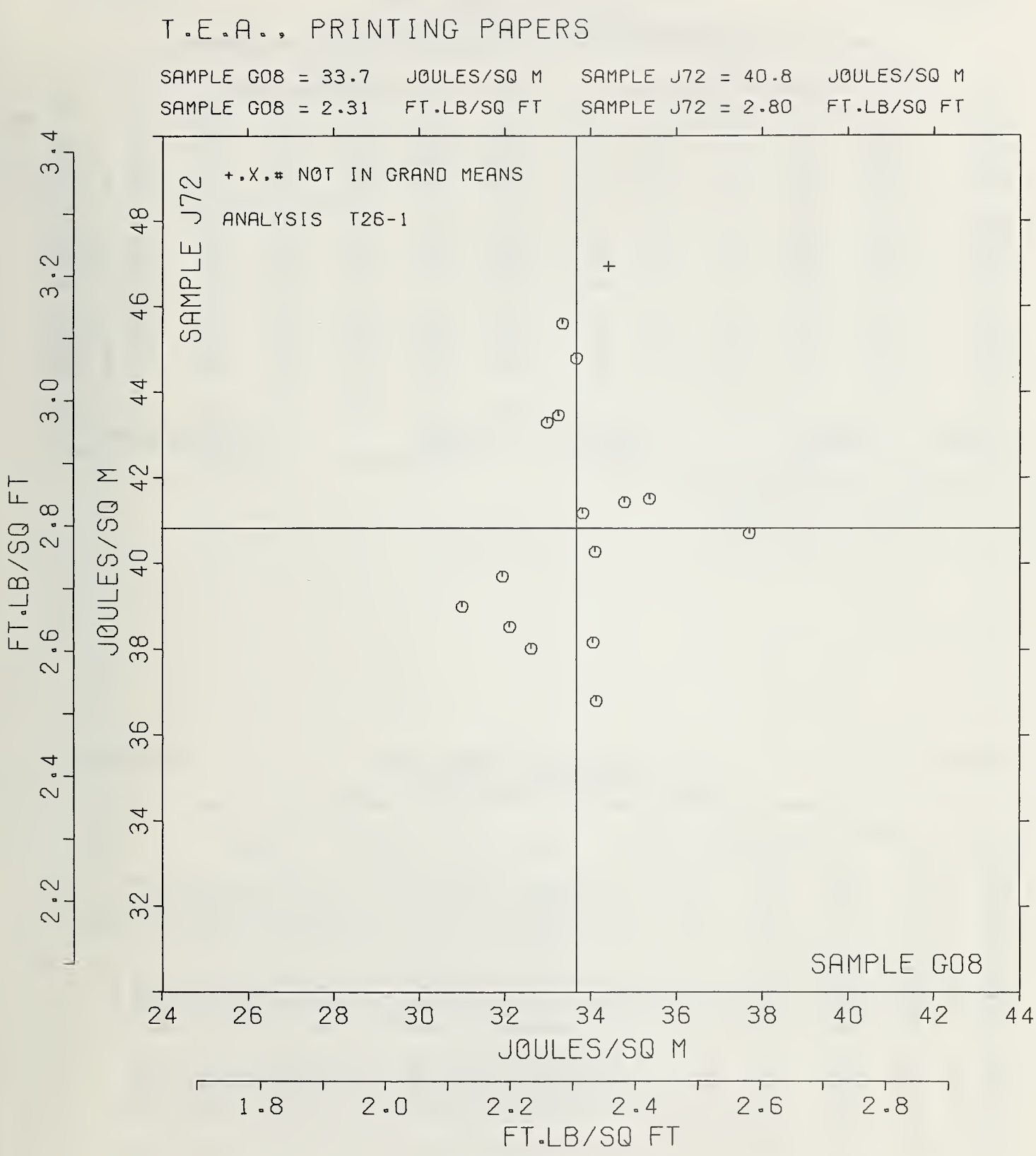
Data from the following laboratories appear to be off by a multiplicative factor: 563

ANALYSIS T26-1 TABLE 2

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER

TAPPI OFFICIAL TEST METHOD T494 OS-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB		MEANS		COORDINATES		AVG		
CODE	F	G08	J72	MAJOR	MINOR	R_0 SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L185	@	31.0	39.0	-2.1	2.4	1.13	26C	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/LINE JAWS
L118	@	31.9	39.7	-1.3	1.6	.85	26E	TENSILE ENERGY ABSORPTION (WITH TEST T20),FLAT/FLAT JAWS
L567	@	32.1	38.5	-2.3	1.3	.96	26A	TENSILE ENERGY ABSORPTION (WITH TEST T20),FLAT/FLAT JAWS
L393	@	32.6	38.0	-2.9	.7	.86	26V	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/FLAT JAWS
L163	@	33.0	43.3	2.4	1.0	.96	26J	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/FLAT JAWS
L575	@	33.2	43.4	2.6	.7	1.04	26A	TENSILE ENERGY ABSORPTION (WITH TEST T20),FLAT/FLAT JAWS
L115	@	33.3	45.6	4.7	.9	.71	26C	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/LINE JAWS
L318	@	33.7	44.8	3.9	.5	1.16	26A	TENSILE ENERGY ABSORPTION (WITH TEST T20),FLAT/FLAT JAWS
L356	@	33.8	41.2	.4	-.1	1.17	26A	TENSILE ENERGY ABSORPTION (WITH TEST T20),FLAT/FLAT JAWS
L592	@	34.1	38.2	-2.6	-.7	.91	26H	TENSILE ENERGY ABSORPTION (WITH TEST T20),2-PIN STRAIN GAGE
L159	@	34.1	40.3	-.3	-.5	1.13	26F	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/FLAT JAWS
L587	@	34.1	36.8	-3.9	-1.0	1.31	26C	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/LINE JAWS
L250	*	34.4	46.9	6.2	-.0	.00	26N	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/FLAT JAWS,20C
L139	@	34.8	41.4	.7	-1.0	1.29	26H	TENSILE ENERGY ABSORPTION (WITH TEST T20),2-PIN STRAIN GAGE
L211	@	35.4	41.5	.9	-1.0	1.10	26Z	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/LINE JAWS
L167	@	37.7	40.7	.4	-4.0	.34	26D	TENSILE ENERGY ABSORPTION (WITH TEST T20),2-PIN STRAIN GAGE
L442	#	38.3	1.8	-38.1	-9.4	.00	26B	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/FLAT JAWS
L309	#	39.6	56.6	16.4	-4.0	2.04	26J	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/FLAT JAWS
L563	#	41.3	52.9	12.9	-.1	2.38	26C	TENSILE ENERGY ABSORPTION (WITH TEST T20),LINE/LINE JAWS
GMEANS:		33.7	40.8			1.00		
		95% ELLIPSE:		7.3	4.5	WITH GAMMA = 82 DEGREES		


T.E.A., PRINTING PAPERS
SAMPLE G08 = 33.7 JOULES/SQ M
SAMPLE G08 = 2.31 FT.LB/SQ FT
SAMPLE J72 = 40.8 JOULES/SQ M
SAMPLE J72 = 2.80 FT.LB/SQ FT
+.X.* NOT IN GRAND MEANS
ANALYSIS T26-1
SAMPLE J72
SAMPLE G08
JOULES/SQ M
FT.LB/SQ FT
24 26 28 30 32 34 36 38 40 42 44
32 34 36 38 40 42 44 46 48
1.8 2.0 2.2 2.4 2.6 2.8
2.2 2.4 2.6 2.8 3.0 3.2 3.4

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ANALYSIS T28-1 TABLE 1

ELONGATION TO BREAK, PERCENT - PACKAGING PAPER

TAPPI OFFICIAL TEST METHODS T404 OS-76 AND T494 OS-70, PENDULUM AND CRE TYPES

LAB	SAMPLE K34 DRAFT 123 GRAMS PER SQUARE METER					SAMPLE J02 BLEACHED 98 GRAMS PER SQUARE METER					TEST D_o = 20		
CODE	MEAN	DEV	NO.DEV	SDR	R. SDR	MEAN	DEV	NO.DEV	SDR	R. SDR	VAR	F	LAB
L106	1.96	.22	1.39	.16	.64	2.41	.27	1.49	.19	1.05	28B	Ø	L106
L151	1.90	.16	1.02	.18	1.15	2.12	-.03	-.17	.19	1.03	28B	Ø	L151
L182	1.55	-.18	-1.13	.10	.65	2.07	-.07	-.42	.12	.66	28B	Ø	L182
L234	1.85	.11	.70	.17	1.10	2.33	.18	1.01	.15	.80	28B	Ø	L234
L264	1.67	-.07	-.43	.11	.70	1.89	-.26	-1.46	.12	.64	28B	Ø	L264
L265	1.63	-.11	-.69	.11	.70	2.16	.01	.08	.14	.77	28A	Ø	L265
L267	1.77	.03	.20	.15	.97	2.18	.03	.18	.14	.79	28B	Ø	L267
L278	1.66	-.08	-.49	.14	.90	2.18	.04	.20	.16	.86	28A	Ø	L278
L280	1.76	.02	.13	.14	.88	2.28	.13	.72	.29	1.61	28B	Ø	L280
L312	1.75	.02	.11	.15	1.00	2.36	.22	1.21	.22	1.21	28B	Ø	L312
L318	1.80	.06	.49	.09	.59	2.29	.14	.80	.17	.95	28A	Ø	L318
L324	1.62	-.12	-.74	.06	.40	1.77	-.38	-2.13	.14	.76	28P	Ø	L324
L580	1.54	-.19	-1.21	.14	.93	2.00	-.15	-.84	.14	.75	28C	Ø	L580
L581	1.68	-.06	-.35	.11	.72	2.21	.06	.36	.16	.90	28A	Ø	L581
L676	2.11	.37	2.33	.57	3.71	2.17	.02	.11	.31	1.70	28B	Ø	L676
L689	1.54	-.19	-1.21	.15	.95	1.94	-.20	-1.15	.28	1.52	28B	Ø	L689

GR_o MEAN = 1.74 PERCENT GRAND MEAN = 2.15 PERCENT TEST DETERMINATIONS = 20

SD MEANS = .16 PERCENT SD OF MEANS = .18 PERCENT 16 LABS IN GRAND MEANS

AVERAGE SDR = .15 PERCENT AVERAGE SDR = .18 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 16

Best values: K34 1.7 ± 0.2 percent
J02 2.2 ± 0.3 percent

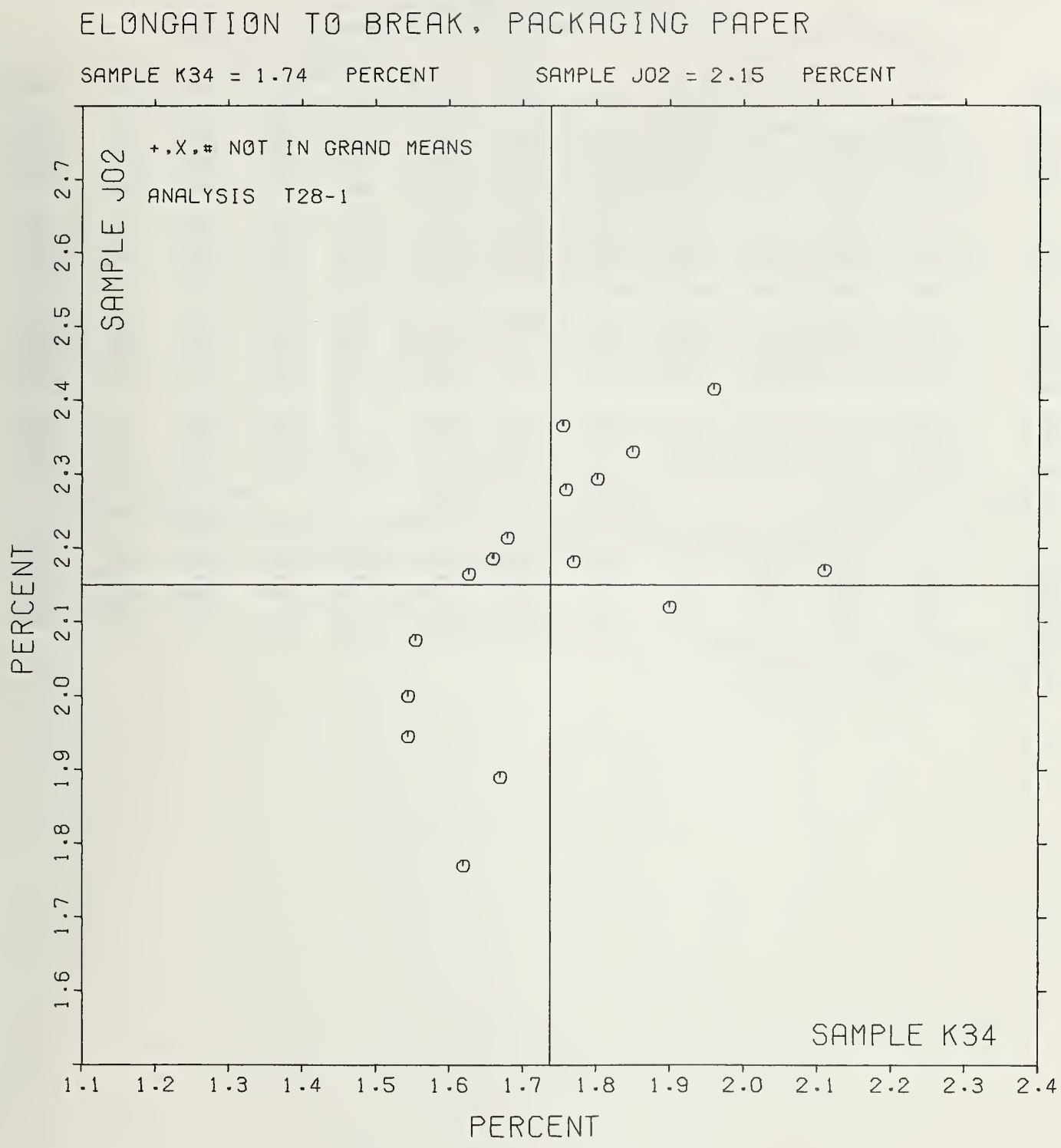
REPORT NO. 61S TAPPI COLLABORATIVE REFERENCE PROGRAM SEPTEMBER 1979

ANALYSIS T28-1 TABLE 2

ELONGATION TO BREAK, PERCENT - PACKAGING PAPER

TAPPI OFFICIAL TEST METHODS T404 OS-76 AND T494 OS-70, PENDULUM AND CRE TYPES

LAB		MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
CODE	F	K34	J02	MAJOR	MINOR	R. SDR	VAR	
L689	Ø	1.54	1.94	-.28	.02	1.04	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L580	Ø	1.54	2.00	-.24	.05	.84	28C	ELONGATION (WITH TEST T19),LOAD CELL,LINE/LINE JAWS
L182	Ø	1.55	2.07	-.17	.09	.65	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L324	Ø	1.62	1.77	-.37	-.15	.58	28P	ELONGATION (WITH TEST T19),LOAD CELL,PATTERNED FLAT JAWS
L265	Ø	1.63	2.16	-.06	.09	.74	28A	ELONGATION (WITH TEST T19),LOAD CELL,FLAT/FLAT JAWS
L278	Ø	1.66	2.18	-.02	.08	.86	28A	ELONGATION (WITH TEST T19),LOAD CELL,FLAT/FLAT JAWS
L264	Ø	1.67	1.89	-.24	-.11	.67	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L581	Ø	1.68	2.21	.01	.09	.91	28A	ELONGATION (WITH TEST T19),LOAD CELL,FLAT/FLAT JAWS
L312	Ø	1.75	2.36	.16	.12	1.10	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L280	Ø	1.76	2.28	.11	.06	1.03	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L267	Ø	1.77	2.18	.04	-.00	.88	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L318	Ø	1.80	2.29	.15	.04	.77	28A	ELONGATION (WITH TEST T19),LOAD CELL,FLAT/FLAT JAWS
L234	Ø	1.85	2.33	.21	.03	.95	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L151	Ø	1.90	2.12	.06	-.14	1.09	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L106	Ø	1.96	2.41	.35	-.00	.65	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
L676	Ø	2.11	2.17	.25	-.27	2.71	28B	ELONGATION (WITH TEST T19),LOAD CELL,LINE/FLAT JAWS
GMEANS:		1.74	2.15			1.00		
		95% ELLIPSE:		.00	.32	WITH GAMMA = 50 DEGREES		


ELONGATION TO BREAK, PACKAGING PAPER
SAMPLE K34 = 1.74 PERCENT
SAMPLE J02 = 2.15 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T28-1
SAMPLE J02
SAMPLE K34
PERCENT
PERCENT
1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7
1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4

ANALYSIS T29-1 TABLE 1

ELONGATION TO BREAK, PERCENT - PRINTING PAPER

TAPPI OFFICIAL TEST METHODS T404 OS-76 AND T494 OS-70, PENDULUM AND CRE TYPES

LAB CODE	SAMPLE G08 MEAN	WRITING 61 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J72 MEAN	PRINTING 76 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	TEST D. = 20
L105	1.337	-.280	-1.03	.147	1.04	1.287	-.433	-1.93	.168	1.14	29A	6	L105	
L118	1.604	-.013	-.08	.111	.79	1.717	-.003	-.01	.107	.73	29A	6	L118	
L139	1.560	-.058	-.33	.157	1.11	1.580	-.140	-.62	.151	1.02	29D	6	L139	
L141T	1.465	-.153	-.89	.185	1.32	1.544	-.176	-.78	.143	.97	29D	6	L141T	
L163	1.537	-.081	-.47	.121	.86	1.730	.010	.05	.102	.69	29B	6	L163	
L176	1.575	-.043	-.25	.217	1.54	1.670	-.050	-.22	.258	1.75	29B	6	L176	
L185	1.480	-.138	-.80	.161	1.14	1.620	-.100	-.45	.115	.78	29C	6	L185	
L190R	1.546	-.071	-.41	.179	1.27	1.517	-.203	-.90	.152	1.03	29A	6	L190R	
L309	1.946	.328	1.90	.240	1.71	2.341	.621	2.76	.250	1.70	29A	*	L309	
L318	1.650	.033	.19	.094	.66	1.996	.276	1.23	.108	.73	29A	6	L318	
L344	1.489	-.128	-.74	.220	1.56	1.610	-.110	-.49	.267	1.81	29A	6	L344	
L356	1.595	-.022	-.13	.123	.88	1.698	-.022	-.10	.137	.93	29A	6	L356	
L386	1.580	-.038	-.22	.120	.85	1.675	-.045	-.20	.141	.96	29A	6	L386	
L442	1.920	.302	1.75	.115	.82	1.830	.110	.49	.057	.39	29B	6	L442	
L567	1.654	.036	.21	.105	.75	1.781	.061	.27	.100	.68	29A	6	L567	
L575	1.575	-.043	-.25	.133	.95	1.750	.030	.13	.128	.87	29A	6	L575	
L587	1.695	.077	.45	.110	.78	1.735	.015	.07	.179	1.21	29C	6	L587	
L592	1.510	-.108	-.62	.133	.95	1.565	-.155	-.69	.160	1.08	29D	6	L592	
L698	2.015	.397	2.30	.104	.74	2.035	.315	1.40	.184	1.25	29C	6	L698	
GR. MEAN = 1.618 PERCENT						GRAND MEAN = 1.720 PERCENT								TEST DETERMINATIONS = 20
SD MEANS = .172 PERCENT						SD OF MEANS = .225 PERCENT								19 LABS IN GRAND MEANS
		AVERAGE SDR = .141 PERCENT					AVERAGE SDR = .148 PERCENT							
L153	1.040	-.578	-3.35	.139	.99	1.235	-.485	-2.16	.127	.86	29R	*	L153	
L242	2.255	.637	3.70	.190	1.35	2.575	.855	3.81	.155	1.05	29R	*	L242	
L484	1.418	-.200	-1.16	.155	1.10	1.612	-.108	-.48	.230	1.56	29R	*	L484	
L626	1.345	-.273	-1.58	.069	.49	1.550	-.170	-.76	.128	.87	29R	*	L626	
L685	1.595	-.023	-.13	.076	.54	2.110	.390	1.74	.189	1.28	29R	*	L685	

TOTAL NUMBER OF LABORATORIES REPORTING = 24

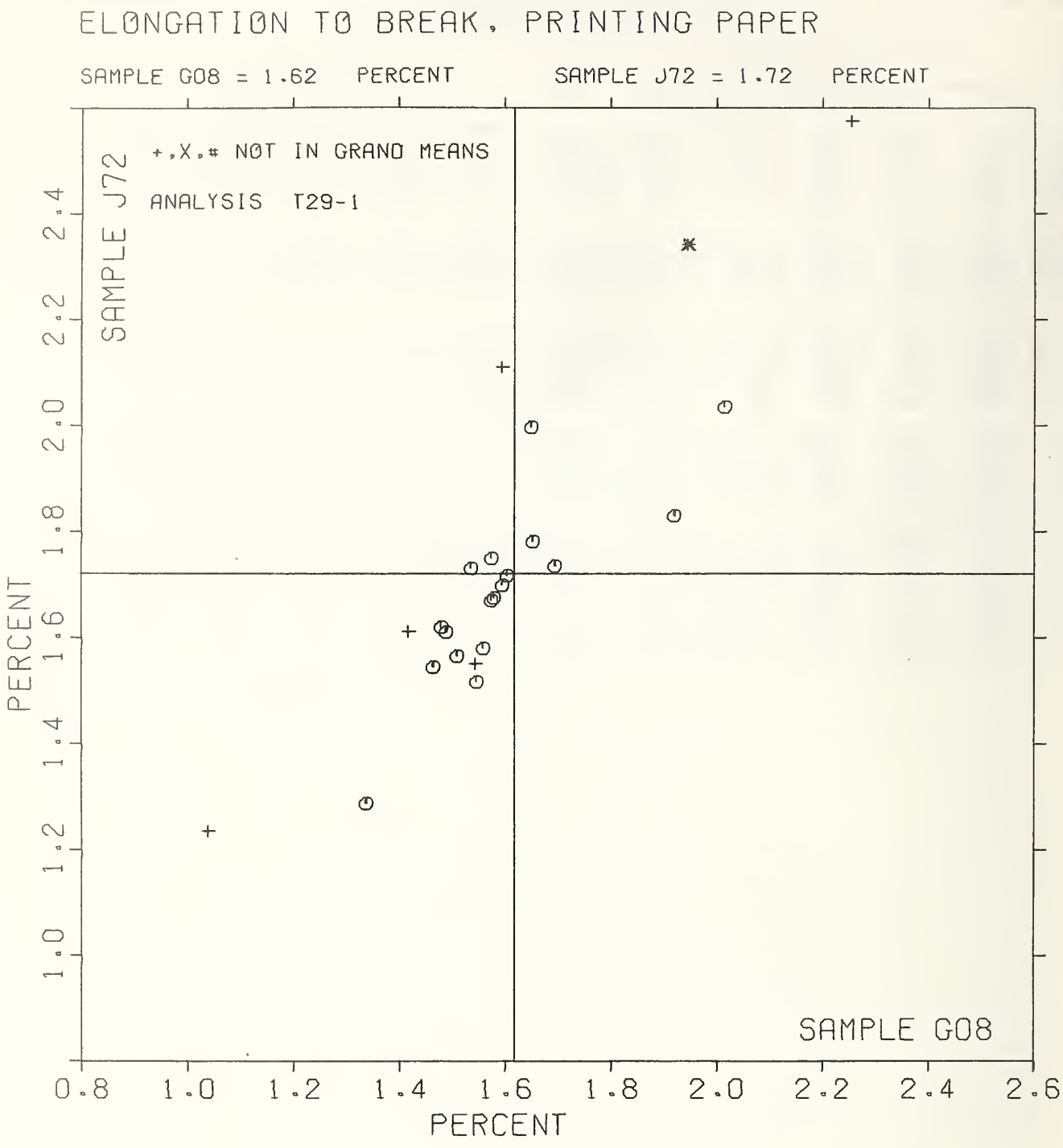
Best values: G08 1.60 ± 0.32 percent
J72 1.69 ± 0.35 percent

ANALYSIS T29-1 TABLE 2

ELONGATION TO BREAK, PERCENT - PRINTING PAPER

TAPPI OFFICIAL TEST METHODS T404 OS-76 AND T494 OS-70, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS GCG	MEANS J72	COORDINATES MAJOR	COORDINATES MINOR	AVG RESID VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L153	*	1.040	1.235	-.733	.179	.92 29R	ELONGATION (WITH TEST T20),PENDULUM, FLAT/FLAT JAWS
L105	G	1.337	1.287	-.515	-.030	1.09 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L484	*	1.418	1.612	-.205	.097	1.03 29R	ELONGATION (WITH TEST T20),PENDULUM, FLAT/FLAT JAWS
L141T	G	1.465	1.544	-.232	.019	1.14 29D	ELONGATION (WITH TEST T20),LOAD CELL,2-PIN STRAIN GAGE
L185	G	1.480	1.620	-.102	.052	.96 29C	ELONGATION (WITH TEST T20),LOAD CELL,LINE/LINE JAWS
L344	G	1.489	1.610	-.104	.038	1.08 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L592	G	1.510	1.565	-.189	-.005	1.01 29D	ELONGATION (WITH TEST T20),LOAD CELL,2-PIN STRAIN GAGE
L163	G	1.537	1.730	-.039	.071	.77 29B	ELONGATION (WITH TEST T20),LOAD CELL,LINE/FLAT JAWS
L626	*	1.545	1.550	-.180	-.042	.88 29R	ELONGATION (WITH TEST T20),PENDULUM, FLAT/FLAT JAWS
L190R	G	1.546	1.517	-.206	-.063	1.45 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L139	G	1.560	1.580	-.147	-.036	1.07 29D	ELONGATION (WITH TEST T20),LOAD CELL,2-PIN STRAIN GAGE
L176	G	1.575	1.670	-.066	.005	1.04 29B	ELONGATION (WITH TEST T20),LOAD CELL,LINE/FLAT JAWS
L575	G	1.575	1.750	-.001	.052	.91 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L386	G	1.580	1.675	-.059	.004	.90 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L685	*	1.595	2.110	.301	.249	.91 29R	ELONGATION (WITH TEST T20),PENDULUM, FLAT/FLAT JAWS
L356	G	1.595	1.698	-.031	.005	.90 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L118	G	1.604	1.717	-.010	.009	.76 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L318	G	1.650	1.996	.242	.137	.70 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L567	G	1.654	1.781	.071	.007	.71 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L587	G	1.695	1.735	.038	-.054	.99 29C	ELONGATION (WITH TEST T20),LOAD CELL,LINE/LINE JAWS
L442	G	1.920	1.830	.267	-.179	.80 29B	ELONGATION (WITH TEST T20),LOAD CELL,LINE/FLAT JAWS
L309	*	1.946	2.341	.695	.102	1.70 29A	ELONGATION (WITH TEST T20),LOAD CELL,FLAT/FLAT JAWS
L698	G	2.015	2.035	.489	-.134	.99 29C	ELONGATION (WITH TEST T20),LOAD CELL,LINE/LINE JAWS
L242	*	2.255	2.575	1.000	-.008	1.20 29R	ELONGATION (WITH TEST T20),PENDULUM, FLAT/FLAT JAWS
GMEANS:		1.618	1.720			1.00	
		95% ELLIPSE:		.753	.206	WITH GAMMA = 53 DEGREES	


ELONGATION TO BREAK, PRINTING PAPER
SAMPLE G08 = 1.62 PERCENT
SAMPLE J72 = 1.72 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T29-1
SAMPLE J72
SAMPLE G08
PERCENT
PERCENT
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T30-1 TABLE 1
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI SUGGESTED METHOD T511 SU-69

LAB CODE	SAMPLE B88 MEAN	HEAT SET OFFSET BOOK 88 GRAMS PER SQUARE METER DEV	No DEV	SDR	Ro SDR	SAMPLE B30 MEAN	BOOK PAPER 77 GRAMS PER SQUARE METER DEV	No DEV	SDP	Ro SDR	TEST Do = 15 VAR	F	LAB
L105	42.7	-8.6	-.65	14.6	.73	17.9	1.3	.61	7.0	1.51	30M	Ø	L105
L118	58.1	6.8	.49	16.4	.81	17.7	1.1	.52	4.4	.95	30D	Ø	L118
L121	33.1	-18.2	-1.32	14.3	.70	16.8	.2	.08	4.2	.89	30M	Ø	L121
L124	72.3	21.0	1.53	26.9	1.52	16.5	-.2	-.08	5.6	1.20	30N	Ø	L124
L150	62.3	11.0	.80	33.7	1.66	15.9	-.7	-.33	4.0	.85	30M	Ø	L150
L159	72.7	21.4	1.55	29.3	1.44	20.3	3.7	1.75	4.8	1.03	30N	Ø	L159
L162	59.4	8.1	.59	27.6	1.36	18.9	2.3	1.09	5.9	1.27	30M	Ø	L162
L163	36.8	-14.5	-1.05	13.9	.67	13.7	-3.0	-1.41	3.8	.80	30N	Ø	L163
L176	73.7	22.4	1.62	34.5	1.70	17.5	.9	.42	3.6	.78	30M	Ø	L176
L182M	74.6	23.3	1.69	25.7	1.27	17.3	.7	.33	4.2	.90	30M	Ø	L182M
L185	59.3	8.0	.58	17.7	.87	15.9	-.8	-.37	4.5	.96	30N	Ø	L185
L190C	105.6	54.3	3.94	46.1	2.27	17.5	.8	.39	4.5	.96	30N	#	L190C
L212	52.7	1.4	.10	11.2	.55	17.1	.5	.23	5.6	1.21	30M	Ø	L212
L223F	53.1	1.8	.13	14.5	.72	16.6	-.0	-.02	4.6	.99	30M	Ø	L223F
L230	50.3	-1.0	-.08	19.6	.96	14.5	-2.2	-1.03	2.8	.59	30N	Ø	L230
L254	46.2	-5.1	-.37	18.7	.92	15.9	-.7	-.33	3.6	.76	30M	Ø	L254
L262	54.3	3.0	.21	21.7	1.07	14.0	-2.6	-1.25	4.2	.90	30N	Ø	L262
L275	51.3	.0	.00	16.1	.80	20.4	3.8	1.78	8.8	1.89	30N	Ø	L275
L278	29.2	-22.1	-1.60	15.8	.78	12.8	-3.8	-1.82	3.5	.75	30C	Ø	L278
L279	63.9	12.6	.91	31.2	1.54	16.1	-.5	-.24	7.0	1.50	30N	Ø	L279
L285A	18.5	-32.8	-2.38	4.2	.21	18.4	1.8	.83	4.3	.93	30N	*	L285A
L285B	81.7	30.4	2.21	26.2	1.29	99.7	83.0	39.34	33.4	7.16	30N	#	L285B
L320	46.6	-4.7	-.34	19.2	.94	15.9	-.7	-.33	3.2	.68	30N	Ø	L320
L326N	41.6	-9.7	-.70	23.4	1.15	16.2	-.4	-.21	5.1	1.08	30N	Ø	L326N
L339	25.3	-26.0	-1.89	10.8	.53	12.3	-4.3	-2.04	2.9	.62	30M	Ø	L339
L366A	56.3	5.0	.36	17.1	.84	18.3	1.6	.77	4.6	.99	30N	Ø	L366A
L376	37.0	-14.3	-1.04	14.2	.70	13.8	-2.8	-1.34	3.1	.66	30N	Ø	L376
L388	61.4	10.1	.73	18.0	.89	18.2	1.6	.74	3.9	.84	30N	Ø	L388
L390	45.1	-6.2	-.45	31.9	1.57	14.9	-1.7	-.81	4.9	1.05	30N	Ø	L390
L393	43.1	-8.2	-.59	12.7	.63	16.5	-.2	-.08	4.1	.88	30M	Ø	L393
L396M	62.7	11.4	.83	40.7	2.01	21.8	5.2	2.45	5.1	1.09	30N	Ø	L396M
L565	55.1	3.8	.28	22.4	1.10	17.0	.4	.17	6.5	1.40	30N	Ø	L565
L589	44.2	-7.1	-.52	7.0	.35	16.3	-.4	-.18	3.3	.71	30N	Ø	L589
L599	53.9	2.6	.19	12.9	.64	17.9	1.2	.58	5.8	1.24	30C	Ø	L599
L670	56.5	5.2	.38	16.2	.80	15.6	-1.0	-.49	4.8	1.04	30N	Ø	L670

GR. MEAN = 51.3 DOUBLE FOLDS — GRAND MEAN = 16.6 DOUBLE FOLDS — TEST DETERMINATIONS = 15
SD MEANS = 13.8 DOUBLE FOLDS — SD OF MEANS = 2.1 DOUBLE FOLDS — 33 LABS IN GRAND MEANS
AVERAGE SDR = 20.3 DOUBLE FOLDS — AVERAGE SDR = 4.7 DOUBLE FOLDS

L182S	40.2	-11.1	-.81	18.2	.89	19.9	3.3	1.56	4.8	1.03	30S	* L182S
L190D	24.2	-27.1	-1.97	6.9	.34	18.7	2.0	.96	5.4	1.15	30S	* L190D
L326S	29.1	-22.2	-1.61	9.6	.47	21.5	4.9	2.32	6.5	1.40	30S	* L326S
L705	45.2	-6.1	-.44	15.2	.75	16.3	-.4	-.18	5.1	1.10	30X	* L705

TOTAL NUMBER OF LABORATORIES REPORTING = 39

Best values: B88 52 double folds
B30 17 double folds

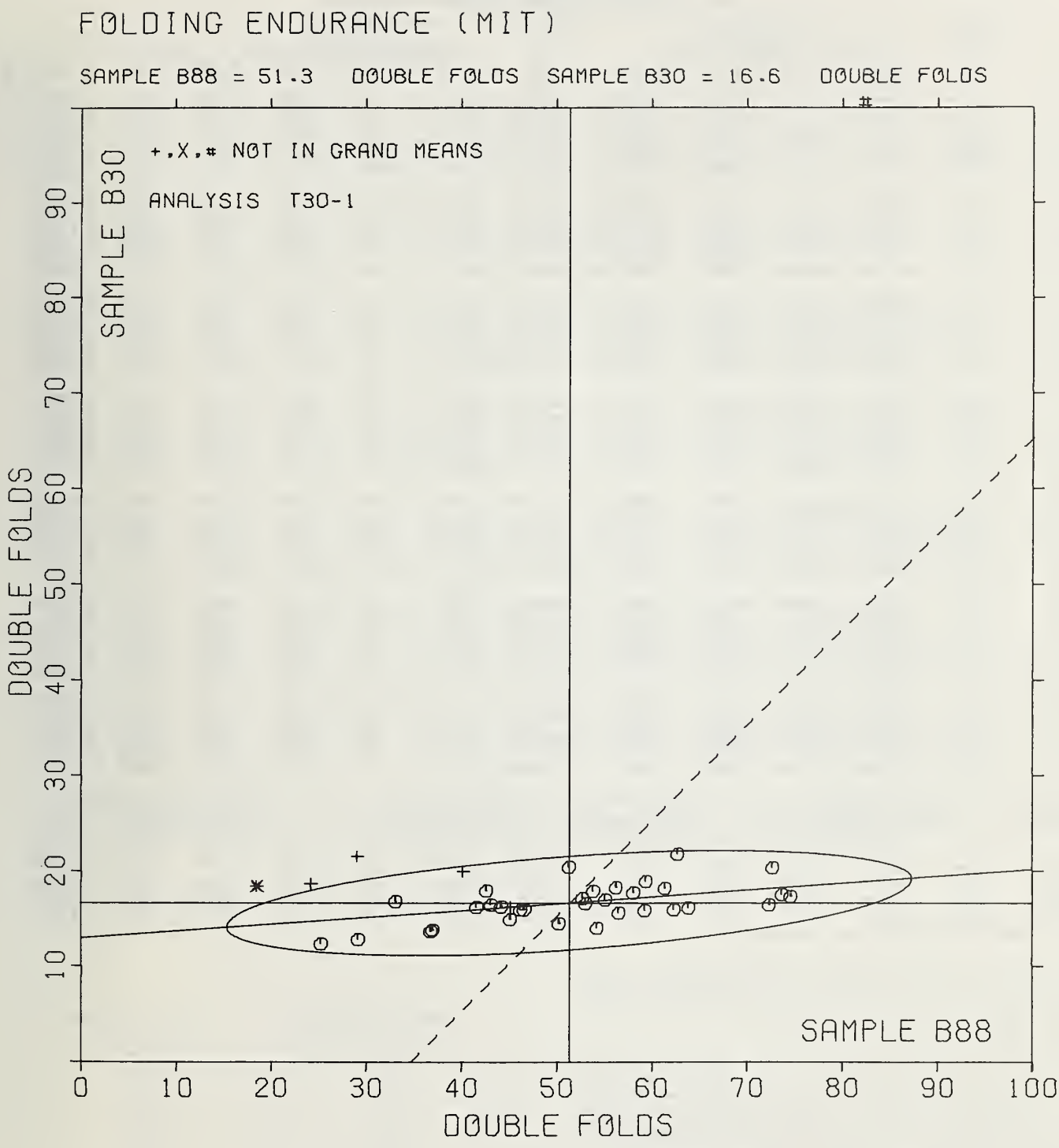
The following laboratories were omitted from the grand means because of extreme test results: 190C, 285B.

The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Please see page 40 of this report for a demonstration of this proposal.

ANALYSIS T30-1 TABLE 2
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI SUGGESTED METHOD T511 SU-69

AB CODE	F	MEANS B88	MEANS B30	COORDINATES MAJOR	COORDINATES MINOR	AVG RESVR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
285A	*	18.5	18.4	-32.0	4.1	.57	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
190D	*	24.2	18.7	-26.9	4.0	.75	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
339	O	25.3	12.3	-26.3	-2.4	.56	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
326S	*	29.1	21.5	-21.8	0.5	.93	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
278	O	29.2	12.8	-22.3	-2.2	.76	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
121	O	33.1	16.8	-18.1	1.5	.60	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
163	O	36.8	13.7	-14.7	-1.9	.74	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
376	O	37.0	13.8	-14.5	-1.8	.68	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
182S	*	40.2	19.9	-10.8	4.1	.56	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
326N	O	41.6	16.2	-9.7	.3	1.12	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
105	O	42.7	17.9	-8.5	1.9	1.12	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
393	O	43.1	16.5	-8.2	.4	.75	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
589	O	44.2	16.3	-7.1	.1	.53	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
390	O	45.1	14.9	-6.3	-1.3	1.31	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
705	*	45.2	16.3	-6.1	.1	.92	30X	FOLDING ENDURANCE: GIVE INSTRUMENT MAKE AND MODEL
254	O	46.2	15.9	-5.1	-.3	.84	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
320	O	46.6	15.9	-4.7	-.4	.81	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
230	O	50.3	14.5	-1.2	-2.1	.78	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
275	O	51.3	20.4	.3	3.8	1.34	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
212	O	52.7	17.1	1.5	.4	.88	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
223F	O	53.1	16.6	1.7	-.2	.85	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
599	O	53.9	17.9	2.0	1.0	.94	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
262	O	54.3	14.0	2.8	-2.8	.59	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
565	O	55.1	17.0	3.8	.1	1.25	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
366A	O	56.3	18.3	5.1	1.3	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
670	O	56.5	15.6	5.1	-1.4	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
118	O	58.1	17.7	6.8	.6	.88	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
185	O	59.3	15.9	7.9	-1.3	.91	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
162	O	59.4	18.9	8.2	1.7	1.32	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
388	O	61.4	18.2	10.2	.6	.86	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
150	O	62.3	15.9	10.9	-1.5	1.25	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
396M	O	62.7	21.8	11.8	4.3	1.35	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
279	O	63.9	16.1	12.5	-1.4	1.52	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
124	O	72.3	16.5	21.0	-1.7	1.26	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
159	O	72.7	20.3	21.6	2.2	1.23	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
176	O	73.7	17.5	22.4	-.7	1.24	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
182M	O	74.6	17.3	23.3	-1.0	1.08	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
285B	#	81.7	99.7	30.3	80.6	4.22	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
190C	#	105.6	17.5	54.2	-3.1	1.61	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
MEANS:		51.3	16.6			1.60		
		95% ELLIPSE:		36.1	4.9	WITH GAMMA = 4 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE B88 = 51.3 DOUBLE FOLDS SAMPLE B30 = 16.6 DOUBLE FOLDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T30-1
SAMPLE B30
DOUBLE FOLDS
SAMPLE B88
DOUBLE FOLDS
0
10
20
30
40
50
60
70
80
90
100

ANALYSIS T30-2 TABLE 1
FOLDING ENDURANCE (MIT)
DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	SAMPLE B88 HEAT SET OFFSET BOOK 88 GRAMS PER SQUARE METER MEAN	DEV	N. DEV	SDR	R. SDR	SAMPLE B30 BOOK PAPER 77 GRAMS PER SQUARE METER MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB	TEST D. = 15
L105	1.590	-.083	-.76	.231	1.38	1.222	.022	.41	.172	1.42	30M	6	L105	
L118	1.749	.077	.65	.116	.70	1.237	.037	.67	.105	.86	30D	6	L118	
L121	1.483	-.189	-1.60	.185	1.11	1.211	.011	.20	.121	1.00	30M	6	L121	
L124	1.838	.166	1.41	.151	.79	1.193	-.007	-.13	.151	1.24	30N	6	L124	
L150	1.740	.067	.57	.228	1.36	1.189	-.010	-.19	.111	.91	30M	6	L150	
L159	1.328	.155	1.32	.161	1.08	1.299	.099	1.80	.091	.74	30N	6	L159	
L162	1.729	.056	.48	.207	1.24	1.255	.056	1.01	.147	1.20	30M	6	L162	
L163	1.538	-.134	-1.14	.163	.97	1.121	-.079	-1.44	.116	.95	30N	6	L163	
L176	1.827	.154	1.31	.195	1.17	1.235	.036	.65	.088	.73	30M	6	L176	
L182M	1.847	.175	1.48	.157	.94	1.227	.027	.49	.107	.88	30M	6	L182M	
L185	1.757	.084	.72	.120	.72	1.185	-.015	-.28	.121	1.00	30N	6	L185	
L190C	1.988	.316	2.68	.181	1.09	1.229	.029	.53	.112	.92	30N	#	L190C	
L212	1.712	.040	.34	.098	.59	1.214	.014	.25	.134	1.10	30M	6	L212	
L223F	1.710	.038	.32	.117	.70	1.202	.003	.05	.132	1.08	30M	6	L223F	
L230	1.668	-.004	-.04	.180	1.08	1.153	-.047	-.86	.084	.69	30N	6	L230	
L254	1.627	-.045	-.39	.197	1.18	1.192	-.008	-.14	.098	.80	30M	6	L254	
L262	1.699	.026	.22	.168	1.13	1.128	-.072	-1.31	.130	1.07	30N	6	L262	
L275	1.692	.020	.17	.128	.77	1.272	.073	1.32	.186	1.53	30N	6	L275	
L278	1.418	-.254	-2.16	.202	1.21	1.091	-.109	-1.99	.126	1.04	30C	6	L278	
L279	1.753	.080	.68	.233	1.40	1.173	-.027	-.49	.180	1.48	30N	6	L279	
L285A	1.257	-.415	-3.52	.099	.60	1.253	.053	.97	.107	.88	30N	X	L285A	
L285B	1.892	.220	1.86	.139	.83	1.974	.774	14.12	.153	1.26	30N	#	L285B	
L320	1.628	-.044	-.38	.206	1.24	1.195	-.005	-.09	.082	.68	30N	6	L320	
L326N	1.565	-.108	-.92	.222	1.33	1.191	-.009	-.16	.131	1.07	30N	6	L326N	
L339	1.360	-.312	-2.65	.207	1.24	1.081	-.119	-2.18	.098	.80	30M	*	L339	
L366A	1.732	.059	.50	.132	.79	1.250	.050	.91	.104	.85	30N	6	L366A	
L376	1.536	-.136	-1.16	.178	1.07	1.130	-.070	-1.27	.094	.77	30N	6	L376	
L388	1.769	.097	.82	.139	.83	1.249	.050	.90	.103	.84	30N	6	L388	
L390	1.579	-.093	-.79	.246	1.47	1.152	-.048	-.87	.143	1.18	30N	6	L390	
L393	1.617	-.056	-.47	.152	.79	1.206	.006	.11	.095	.78	30M	6	L393	
L396M	1.730	.057	.48	.241	1.45	1.328	.128	2.33	.101	.83	30N	*	L396M	
L565	1.701	.029	.24	.206	1.24	1.204	.004	.08	.153	1.26	30N	6	L565	
L589	1.640	-.032	-.27	.067	.40	1.203	.003	.06	.089	.73	30N	6	L589	
L599	1.719	.047	.40	.108	.65	1.232	.032	.58	.138	1.13	30C	6	L599	
L670	1.738	.065	.55	.113	.68	1.176	-.024	-.43	.122	1.00	30N	6	L670	

GR. MEAN = 1.672 LOG(10) FOLD — GRAND MEAN = 1.200 LOG(10) FOLD — TEST DETERMINATIONS = 15
SD MEANS = .118 LOG(10) FOLD — SD OF MEANS = .055 LOG(10) FOLD — 32 LABS IN GRAND MEANS
AVERAGE SDR = 1.07 LOG(10) FOLD — AVERAGE SDR = .122 LOG(10) FOLD

L182S	1.561	-.111	-.95	.203	1.22	1.288	.088	1.60	.105	.87	30S	*	L182S
L190D	1.368	-.304	-2.60	.119	.72	1.256	.056	1.02	.117	.96	30S	*	L190D
L326S	1.442	-.230	-1.96	.144	.86	1.311	.111	2.03	.151	1.24	30S	*	L326S
L705	1.634	-.038	-.33	.138	.83	1.188	-.011	-.21	.152	1.25	30X	*	L705

TOTAL NUMBER OF LABORATORIES REPORTING = 39

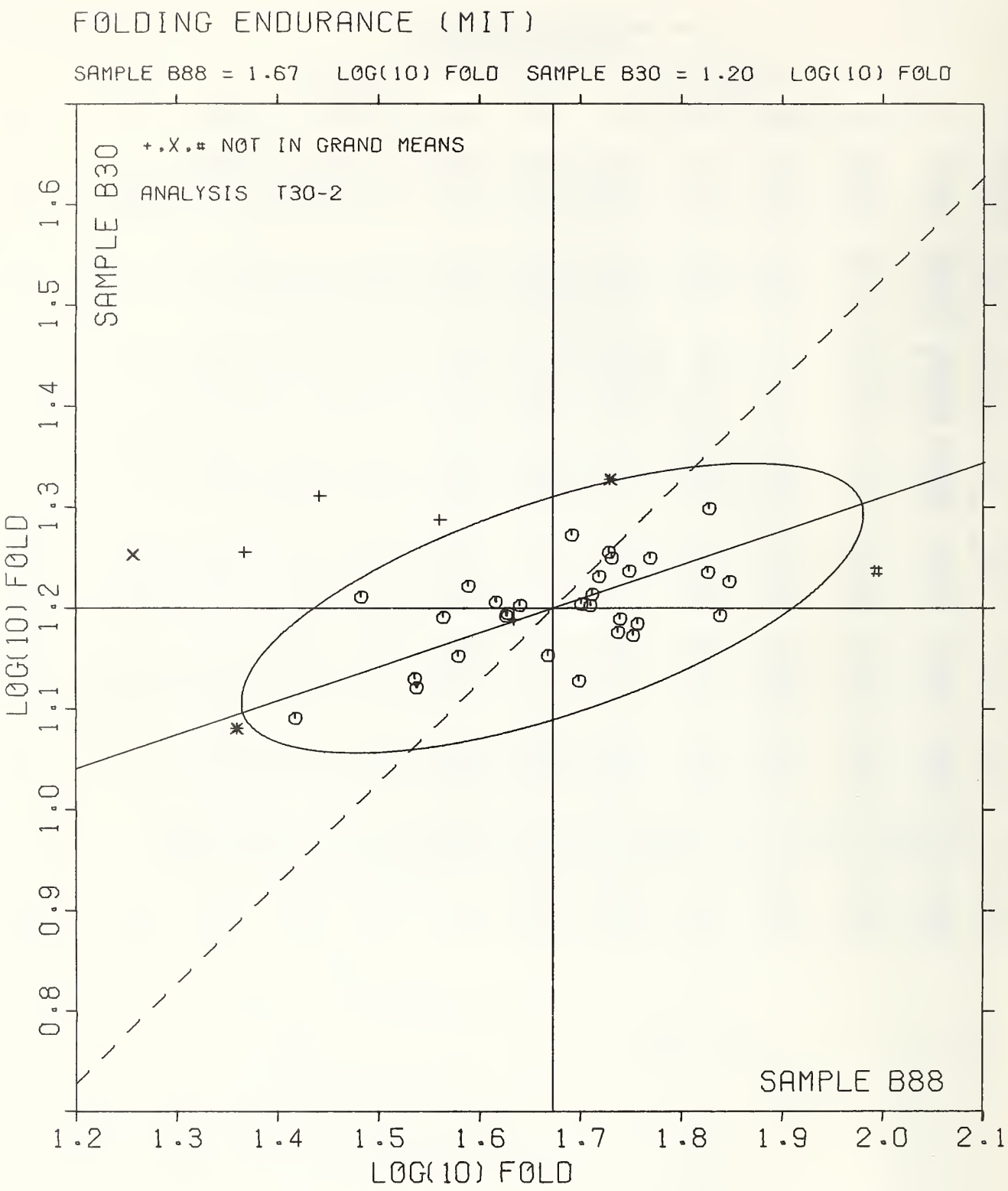
The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Analysis T30-1 in this report is the same as in the past with no changes. The analysis, T30-2, shows the data as the ISO proposes. This analysis uses the raw data reported for T30-1. The raw data are converted to the logarithm (base 10) as shown in the example to the right, and then the mean of the converted data is calculated and reported as ISO folding endurance.

Raw data (Folding number in double folds)	log (base 10) of raw data
207	2.32
166	2.22
151	2.18
352	2.55
200	2.31
137	2.14
199	2.30
230	2.36
---	----
210	2.31
mean of raw data	mean of logs "Folding endurance"

ANALYSIS T30-2 TABLE 2
FOLDING ENDURANCE (MIT)
DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	F	MEANS B88	MEANS B30	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SQR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L285A	X	1.257	1.253	-.376	.183	.74	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L339	*	1.360	1.081	-.334	-.013	1.62	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L190D	*	1.368	1.256	-.270	.150	.64	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L278	0	1.418	1.091	-.276	-.022	1.12	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L326S	*	1.442	1.311	-.183	.179	1.05	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L121	0	1.483	1.211	-.176	.071	1.65	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L376	0	1.536	1.130	-.152	-.022	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L163	0	1.538	1.121	-.153	-.032	.90	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182S	*	1.561	1.288	-.076	.119	1.04	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L326N	0	1.565	1.191	-.105	.026	1.20	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L390	0	1.579	1.152	-.103	-.015	1.02	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L105	0	1.590	1.222	-.071	.048	1.40	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L393	0	1.617	1.206	-.051	.024	.78	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L254	0	1.627	1.192	-.040	.007	.99	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L320	0	1.628	1.195	-.044	.009	.96	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L705	*	1.634	1.188	-.040	.001	1.04	30X	FOLDING ENDURANCE: GIVE INSTRUMENT MAKE AND MODEL
L589	0	1.640	1.203	-.029	.013	.57	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L230	0	1.668	1.153	-.019	-.043	.68	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L275	0	1.692	1.272	.042	.062	1.15	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L262	0	1.699	1.128	.002	-.077	1.10	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L565	0	1.701	1.204	.029	-.005	1.25	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L223F	0	1.710	1.202	.037	-.010	.89	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L212	0	1.712	1.214	.042	.001	.64	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L595	0	1.719	1.232	.054	.015	.89	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L162	0	1.729	1.255	.071	.035	1.22	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L396M	*	1.730	1.328	.095	.103	1.14	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L366A	0	1.732	1.250	.072	.028	.82	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L670	0	1.738	1.176	.054	-.043	.64	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L150	0	1.740	1.189	.060	-.031	1.14	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L118	0	1.749	1.237	.084	.011	.78	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L279	0	1.753	1.173	.067	-.051	1.44	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	0	1.757	1.185	.075	-.041	.86	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L388	0	1.769	1.249	.108	.016	.64	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L176	0	1.827	1.235	.157	-.016	.95	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L159	0	1.828	1.299	.179	.044	.91	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	0	1.838	1.193	.155	-.060	1.61	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	0	1.847	1.227	.174	-.030	.91	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L285B	#	1.892	1.974	.455	.664	1.05	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190C	#	1.988	1.229	.308	-.073	1.00	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
GMEANS:		1.672	1.200			1.00		
		95% ELLIPSE:		.324	.105	WITH GAMMA = 18 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE B88 = 1.67 LOG(10) FOLD SAMPLE B30 = 1.20 LOG(10) FOLD
+.X.# NOT IN GRAND MEANS
ANALYSIS T30-2
SAMPLE B30
LOG(10) FOLD
SAMPLE B88
LOG(10) FOLD
0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1

ANALYSIS T35-1 TABLE 1

GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

LAB	SAMPLE J28 PRINTING 93 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	SAMPLE K04 PRINTING 103 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	VAR	F	TEST D. = 10 LAB
L118	458.	-7.	-.22	41.	1.59	235.	-7.	-.25	12.	.93	35G	Ø	L118
L121	488.	22.	.68	35.	1.26	230.	-12.	-.42	11.	.80	35G	Ø	L121
L132	470.	4.	.13	36.	1.37	276.	28.	.99	17.	1.29	35G	Ø	L132
L139	455.	-11.	-.31	16.	.60	230.	-12.	-.43	9.	.69	35G	Ø	L139
L148	445.	-21.	-.62	26.	1.00	216.	-24.	-.85	12.	.88	35G	Ø	L148
L153	476.	10.	.30	32.	1.22	248.	6.	.23	8.	.58	35G	Ø	L153
L159	501.	35.	1.04	17.	.66	270.	28.	1.01	15.	1.11	35G	Ø	L159
L162	384.	-82.	-2.40	33.	1.28	219.	-22.	-.79	18.	1.37	35G	*	L162
L163	472.	6.	.19	20.	.77	264.	-38.	-1.34	8.	.59	35G	Ø	L163
L172	428.	-38.	-1.11	7.	.25	219.	-23.	-.82	7.	.56	35G	Ø	L172
L183	536.	70.	2.06	17.	.63	266.	45.	1.58	16.	1.20	35G	Ø	L183
L190C	396.	-79.	-2.34	26.	1.00	186.	-55.	-1.96	16.	1.17	35G	Ø	L190C
L195	469.	4.	.11	29.	1.13	246.	4.	.14	6.	.49	35G	Ø	L195
L212	508.	43.	1.26	34.	1.31	308.	66.	2.34	67.	5.08	35G	Ø	L212
L223	457.	-8.	-.24	12.	.44	238.	-4.	-.14	10.	.72	35G	Ø	L223
L224	471.	5.	.16	16.	.60	237.	-5.	-.16	14.	1.07	35G	Ø	L224
L241	502.	36.	1.07	25.	.94	266.	24.	.84	18.	1.35	35G	Ø	L241
L254	437.	-28.	-.83	24.	.94	230.	-12.	-.43	10.	.79	35G	Ø	L254
L260	476.	11.	.32	5.	.19	263.	21.	.75	5.	.35	35G	Ø	L260
L285	459.	-6.	-.16	26.	.99	248.	6.	.21	9.	.72	35G	Ø	L285
L291	491.	25.	.74	24.	.92	256.	8.	.30	12.	.93	35G	Ø	L291
L308	470.	4.	.12	42.	1.62	241.	-1.	-.03	9.	.67	35G	Ø	L308
L348	479.	14.	.40	58.	2.22	257.	15.	.52	19.	1.46	35G	Ø	L348
L356	444.	-22.	-.64	29.	1.13	226.	-16.	-.55	6.	.47	35G	Ø	L356
L376	477.	11.	.32	28.	1.09	238.	-4.	-.14	8.	.62	35G	Ø	L376
L382	492.	26.	.76	25.	.98	258.	16.	.57	16.	1.23	35G	Ø	L382
L390	472.	6.	.19	22.	.86	237.	-5.	-.16	12.	.91	35G	Ø	L390
L562	394.	-72.	-2.11	53.	2.02	184.	-58.	-2.05	13.	.96	35G	Ø	L562
L567	440.	-26.	-.76	29.	1.13	211.	-31.	-1.09	19.	1.45	35G	Ø	L567
L571	487.	21.	.63	22.	.83	304.	62.	2.20	18.	1.39	35G	*	L571
L600	475.	9.	.26	11.	.44	237.	-5.	-.18	6.	.46	35G	Ø	L600
L650	501.	35.	1.04	18.	.69	246.	4.	.13	7.	.50	35G	Ø	L650

GR. MEAN = 466. GURLEY UNITS GRAND MEAN = 242. GURLEY UNITS TEST DETERMINATIONS = 10

SD MEANS = 34. GURLEY UNITS SD OF MEANS = 28. GURLEY UNITS 32 LABS IN GRAND MEANS

AVERAGE SDR = 20. GURLEY UNITS AVERAGE SDR = 13. GURLEY UNITS

L213	468.	3.	.08	39.	1.51	229.	-13.	-.45	10.	.74	35H	*	L213

TOTAL NUMBER OF LABORATORIES REPORTING = 33

Best values: J28 470 ± 53 Gurley units

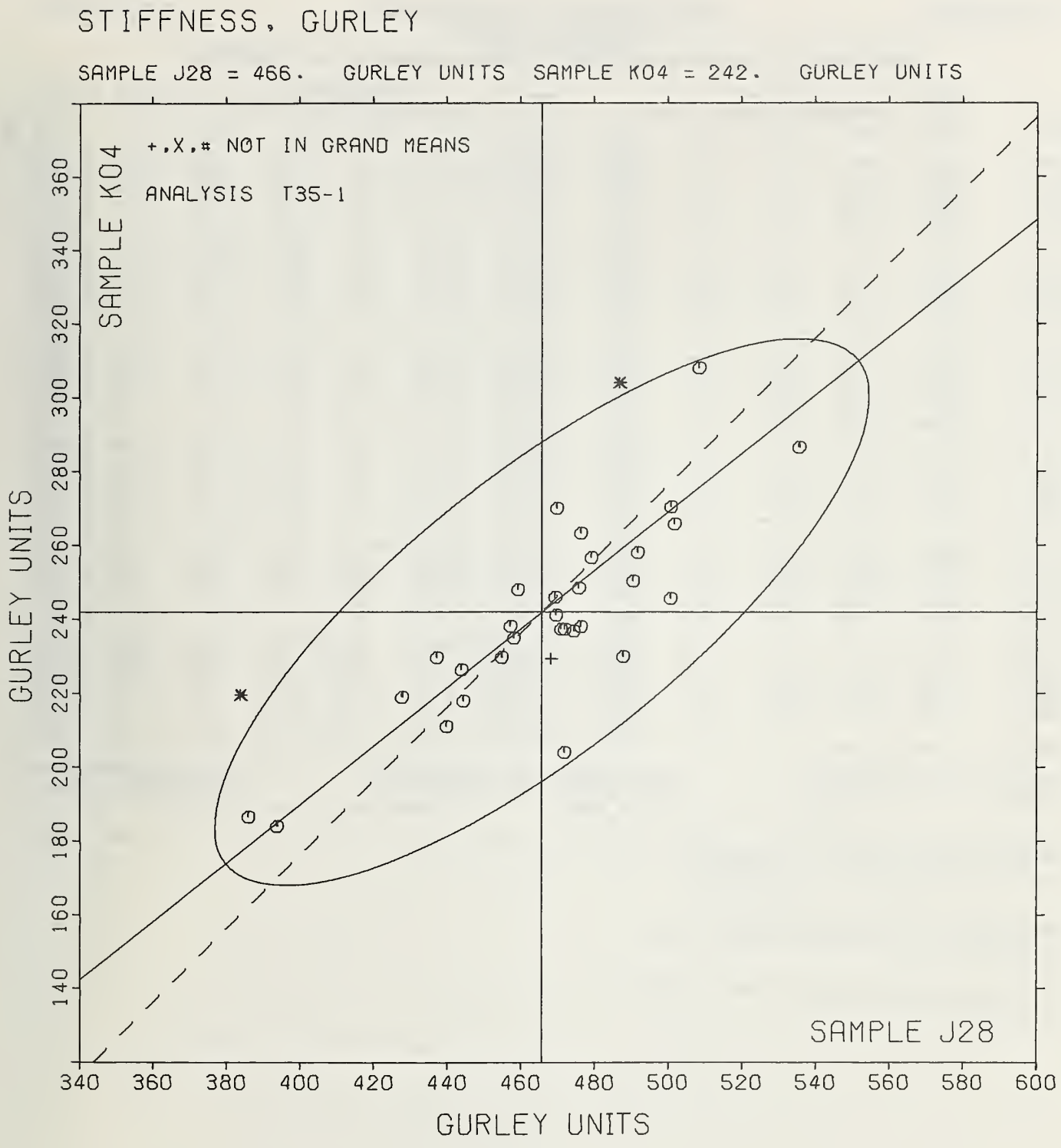
K04 240 ± 56 Gurley units

ANALYSIS T35-1 TABLE 2

GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

LAB CODE	F	MEANS J28	MEANS K04	COORDINATES MAJOR	COORDINATES MINOR	AVG RESULT	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L162	*	384.	219.	-7.	33.	1.33	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L190C	G	386.	186.	-97.	0.	1.09	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L562	G	394.	184.	-92.	-1.	1.49	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L172	G	428.	219.	-44.	5.	.41	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L254	G	437.	230.	-30.	8.	.85	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L567	G	440.	211.	-39.	-8.	1.29	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L356	G	444.	226.	-27.	1.	.80	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L148	G	445.	218.	-31.	-0.	.74	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L139	G	455.	230.	-16.	-3.	.64	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L223	G	457.	238.	-9.	2.	.58	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L118	G	458.	235.	-10.	-1.	1.26	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L285	G	459.	248.	-1.	9.	.85	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L213	*	468.	229.	-0.	-12.	1.12	35H	STIFFNESS, GURLEY (UNITS: MG/1X3 TEST PIECE), 20 C, 65% RH
L195	G	469.	246.	3.	1.	.81	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L308	G	470.	241.	3.	-3.	1.14	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L132	G	470.	270.	21.	19.	1.03	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L224	G	471.	237.	1.	-7.	.83	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L163	G	472.	204.	-19.	-34.	.65	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L390	G	472.	237.	2.	-0.	.88	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L600	G	475.	237.	4.	-10.	.45	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L153	G	476.	248.	12.	-1.	.90	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L260	G	476.	263.	22.	10.	.27	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L376	G	477.	238.	6.	-10.	.60	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L348	G	479.	257.	20.	3.	1.04	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L571	*	487.	304.	55.	35.	1.41	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L121	G	488.	230.	10.	-23.	1.03	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L291	G	491.	250.	25.	-9.	.53	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L382	G	492.	258.	31.	-4.	1.10	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L650	G	501.	246.	30.	-19.	.60	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L159	G	501.	270.	45.	0.	.09	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L241	G	502.	266.	43.	-4.	1.15	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L212	G	508.	308.	75.	25.	3.19	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L183	G	536.	286.	82.	-8.	.92	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
GMEANS:		466.	242.			1.00		
		95% ELLIPSE:		109.	37.	WITH GAMMA = 38 DEGREES		


STIFFNESS, GURLEY
SAMPLE J28 = 466. GURLEY UNITS SAMPLE K04 = 242. GURLEY UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T35-1
SAMPLE K04
GURLEY UNITS
140 160 180 200 220 240 260 280 300 320 340 360
SAMPLE J28
340 360 380 400 420 440 460 480 500 520 540 560 580 600
GURLEY UNITS

ANALYSIS T36-1 TABLE 1

TABER STIFFNESS

TAPPI OFFICIAL TEST METHOD T489 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	SAMPLE B63 KRAFT 124 GRAMS PER SQUARE METER MEAN	DEV	No. DEV	SDR	Ro. SDR	SAMPLE Z01 INDEX PAPER 225 GRAMS PER SQUARE METER MEAN	DEV	No. DEV	SDR	Ro. SDR	VAR	F	LAB
L107A	20.70	1.82	1.99	1.42	1.80	63.70	.99	.27	2.31	.94	36T	@	L107A
L123	18.70	-.18	-.19	1.16	1.47	57.50	-5.21	-1.41	3.24	1.31	36T	@	L123
L126	18.30	-.58	-.63	.59	.70	62.85	.14	.04	2.61	1.06	36T	@	L126
L150	19.40	.52	.57	.64	1.07	69.50	6.79	1.85	1.58	.64	36T	@	L150
L163	20.20	1.32	1.45	1.09	1.38	65.05	2.34	.64	2.09	.85	36T	@	L163
L182	18.75	-.13	-.14	.75	.96	66.73	-1.98	-.54	2.09	.85	36T	@	L182
L207	19.54	.66	.73	.85	1.08	65.15	2.44	.66	4.41	1.78	36T	@	L207
L212	18.37	-.50	-.55	.29	.37	60.70	-2.01	-.55	1.71	.69	36T	@	L212
L219	18.25	-.63	-.68	.92	1.17	60.55	-2.16	-.59	2.34	.95	36T	@	L219
L228	17.20	-1.68	-1.83	.83	.80	92.10	29.39	7.98	4.41	1.78	36T	#	L228
L230	23.60	4.72	5.19	1.35	1.71	71.80	9.09	2.47	4.16	1.68	36T	X	L230
L242	19.80	.92	1.01	.79	1.00	66.25	5.54	1.51	2.06	.83	36T	@	L242
L262	19.80	.92	1.01	.54	.68	63.80	1.09	.30	2.06	.83	36T	@	L262
L281	19.54	.66	.73	.85	1.08	71.45	8.74	2.37	3.54	1.43	36T	@	L281
L290	17.35	-1.53	-1.67	.63	.79	58.90	-3.81	-1.03	2.51	1.02	36T	@	L290
L313	19.02	.15	.16	.42	.53	63.05	.34	.09	2.75	1.11	36T	@	L313
L315	18.90	.02	.03	1.10	1.39	60.90	-1.81	-.49	2.02	.82	36T	@	L315
L318	18.43	-.45	-.49	.55	.69	58.98	-3.73	-1.01	2.38	.96	36T	@	L318
L324	20.29	1.41	1.54	.80	1.02	65.04	.33	.09	2.29	.93	36T	@	L324
L339	19.77	.89	.96	1.85	2.34	65.74	3.03	.82	2.83	1.15	36T	@	L339
L348	56.74	37.86	41.36	4.68	5.17	156.20	93.49	25.39	11.51	4.66	36T	#	L348
L388	36.45	17.57	19.21	2.09	2.65	85.40	22.69	6.16	6.38	2.58	36T	#	L388
L442	17.58	-1.30	-1.42	.65	.82	59.45	-3.26	-.88	2.67	1.08	36T	@	L442
L484	17.61	-1.27	-1.38	.75	.95	57.06	-5.65	-1.53	1.95	.79	36T	@	L484
L570	19.70	.82	.90	1.34	1.69	67.00	4.29	1.17	3.09	1.25	36T	@	L570
L580	19.40	-.48	-.52	.52	.65	62.70	-.01	-.00	2.06	.83	36T	@	L580
L604	19.10	.22	.24	.77	.98	62.90	.19	.05	2.75	1.11	36T	@	L604
L616	17.82	-1.06	-1.15	.41	.52	59.00	-3.71	-1.01	1.60	.65	36T	@	L616
L651	17.80	-1.08	-1.18	.42	.53	65.40	2.69	.73	2.37	.96	36T	@	L651
L692	17.95	-.93	-1.01	.64	.82	58.05	-4.66	-1.26	2.09	.85	36T	@	L692
L703	18.58	-.29	-.32	.41	.52	61.68	-1.03	-.28	3.30	1.34	36T	@	L703

GR. MEAN = 18.88 TABER UNITS GRAND MEAN = 62.71 TABER UNITS TEST DETERMINATIONS = 10

SD MEANS = .91 TABER UNITS SD OF MEANS = 3.68 TABER UNITS 27 LABS IN GRAND MEANS

AVERAGE SDR = .79 TABER UNITS AVERAGE SDR = 2.47 TABER UNITS

L250	18.15	-.73	-.79	.67	.85	64.25	1.54	.42	2.06	.83	36U	*	L250

TOTAL NUMBER OF LABORATORIES REPORTING = 32

Best values: B63 18.8 ± 1.2 Taber units

Z01 62.8 ± 5.7 Taber units

The following laboratories were omitted from the grand means because of extreme test results: 228, 388.

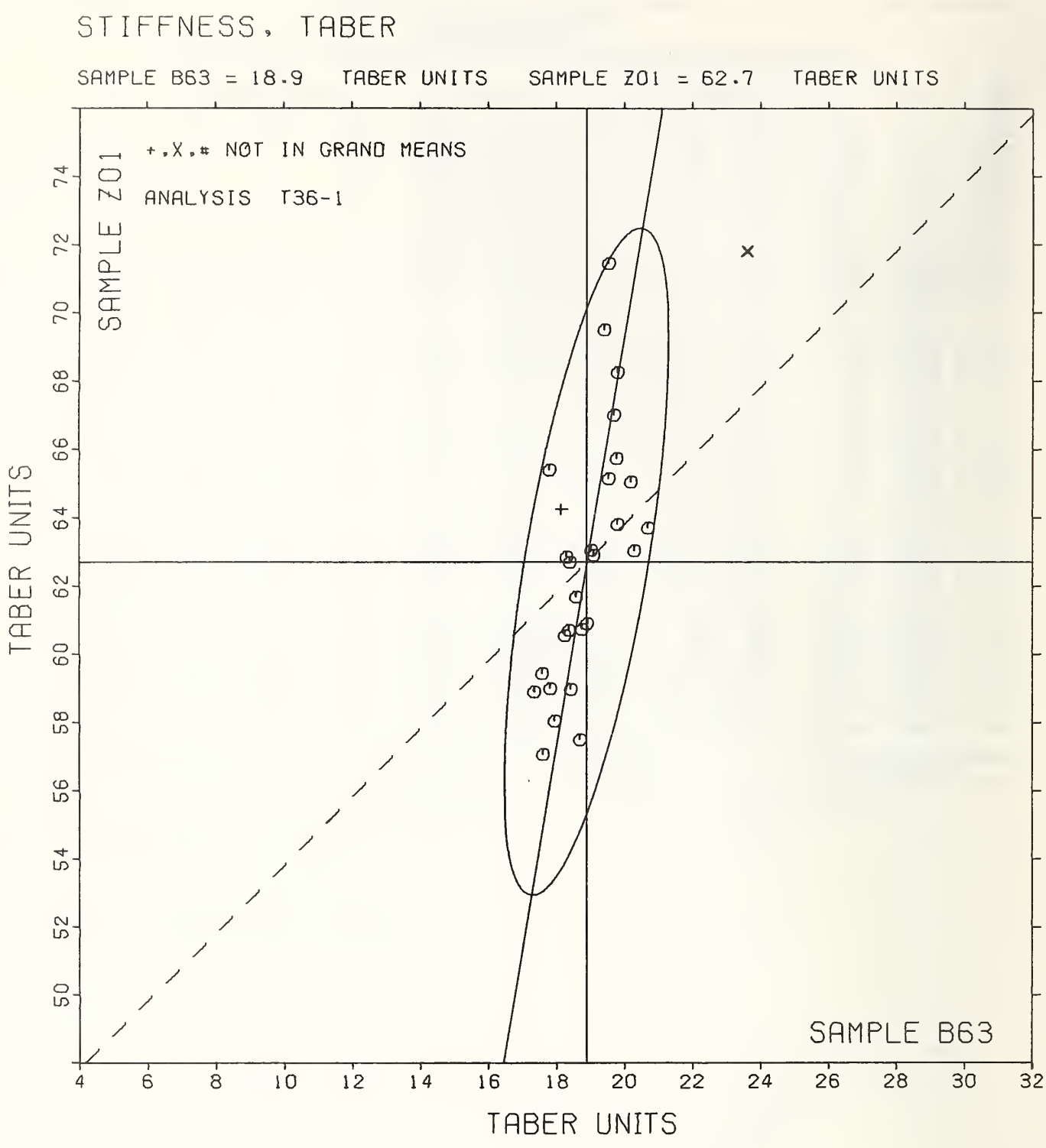
Data from the following laboratories appear to be off by a multiplicative factor: 348

ANALYSIS T36-1 TABLE 2

TABER STIFFNESS

TAPPI OFFICIAL TEST METHOD T489 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	F	MEANS B63	MEANS Z01	COORDINATES MAJOR	COORDINATES MINOR	AVG RESID VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L228	#	17.20	92.10	28.72	6.49	1.29	36T STIFFNESS, TABER
L290	G	17.35	58.90	-4.01	.68	.91	36T STIFFNESS, TABER
L442	G	17.58	59.45	-3.43	.74	.95	36T STIFFNESS, TABER
L484	G	17.61	57.06	-5.78	.32	.07	36T STIFFNESS, TABER
L651	G	17.80	65.40	2.48	1.50	.75	36T STIFFNESS, TABER
L616	G	17.82	59.00	-3.63	.43	.56	36T STIFFNESS TABER
L692	G	17.95	58.05	-4.75	.15	.63	36T STIFFNESS, TABER
L250	*	18.15	64.25	1.40	.97	.04	36U STIFFNESS, TABER, 20 C, 65% RH
L219	G	18.25	60.55	-2.23	.26	1.00	36T STIFFNESS, TABER
L126	G	18.30	62.85	.05	.59	.68	36T STIFFNESS, TABER
L212	G	18.37	60.70	-2.06	.16	.03	36T STIFFNESS, TABER
L580	G	18.40	62.70	-.08	.47	.74	36T STIFFNESS, TABER
L318	G	18.43	58.98	-3.75	-.17	.83	36T STIFFNESS, TABER
L703	G	18.58	61.68	-1.06	.12	.93	36T STIFFNESS, TABER
L123	G	18.70	57.50	-5.16	-.68	1.39	36T STIFFNESS, TABER
L182	G	18.75	60.73	-1.97	-.20	.90	36T STIFFNESS, TABER
L315	G	18.90	60.90	-1.78	-.32	1.11	36T STIFFNESS, TABER
L313	G	19.02	63.05	.36	-.09	.82	36T STIFFNESS, TABER
L604	G	19.10	62.90	.23	-.19	1.05	36T STIFFNESS, TABER
L150	G	19.40	69.50	6.79	.00	.85	36T STIFFNESS, TABER
L281	G	19.54	71.45	8.73	.78	1.26	36T STIFFNESS, TABER
L207	G	19.54	65.15	2.32	-.25	1.43	36T STIFFNESS, TABER
L570	G	19.70	67.00	4.37	-.11	1.47	36T STIFFNESS, TABER
L339	G	19.77	65.74	3.14	-.38	1.74	36T STIFFNESS, TABER
L262	G	19.80	63.80	1.23	-.73	.76	36T STIFFNESS, TABER
L242	G	19.80	68.25	5.62	.00	.92	36T STIFFNESS, TABER
L163	G	20.20	65.05	2.53	-.92	1.11	36T STIFFNESS, TABER
L324	G	20.29	63.04	.36	-1.34	.97	36T STIFFNESS, TABER
L107A	G	20.70	63.70	1.28	-1.64	1.37	36T STIFFNESS, TABER
L230	X	23.60	71.80	9.75	-3.16	1.70	36T STIFFNESS, TABER
L388	#	36.45	85.40	25.27	-13.60	2.61	36T STIFFNESS, TABER
L348	#	56.74	156.20	98.45	-21.97	4.91	36T STIFFNESS, TABER
GMEANS:		18.88	62.71			1.00	
		95% ELLIPSE:		9.90	1.83	WITH GAMMA = 80 DEGREES	


STIFFNESS, TABER
SAMPLE B63 = 18.9 TABER UNITS
SAMPLE Z01 = 62.7 TABER UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T36-1
SAMPLE Z01
TABER UNITS
50
52
54
56
58
60
62
64
66
68
70
72
74
SAMPLE B63
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
TABER UNITS

ANALYSIS T49-1 TABLE 1

SURFACE PICK STRENGTH, IGT - VISCOSITY VELOCITY PRODUCT (VVP) IN KILOPOISE CENTIMETERS/SECOND

TAPPI SUGGESTED METHODS T514 SU-69 AND T499 SU-64

LAB CODE	SAMPLE J54 149 GRAMS PER SQUARE METER MEAN	DEV	NO.DEV	SDR	RO.SDR	SAMPLE J56 93 GRAMS PER SQUARE METER MEAN	DEV	NO.DEV	SDR	RO.SDR	TEST DO.= 4 VAR	F	LAB
L122	63.7	-23.5	-.65	2.6	.34	76.9	-52.7	-.97	2.0	.27	49Q	6	L122
L149	93.9	6.7	.24	5.6	.92	167.8	38.2	.71	8.7	1.17	49L	6	L149
L182I	74.8	-12.4	-.45	6.5	1.66	82.6	-46.9	-.87	10.2	1.37	49Q	6	L182I
L190C	56.7	-30.4	-1.13	3.2	.53	69.0	-60.6	-1.12	5.4	.72	49T	6	L190C
L207	83.0	-4.2	-.15	3.8	.03	132.0	2.4	.04	2.8	.38	49I	6	L207
L242	1400.0	1312.8	47.34	70.7	11.60	2062.5	1932.9	35.72	75.0	10.11	49P	#	L242
L277	72.1	-15.0	-.54	4.5	.75	68.2	-41.4	-.76	10.0	1.35	49I	6	L277
L280	73.0	-14.2	-.51	10.0	1.64	112.2	-17.4	-.32	4.5	.60	49Q	6	L280
L291	87.0	-.1	-.00	8.5	1.39	NO DATA REPORTED FOR SAMPLE J56					49I	M	L291
L313	152.2	65.1	2.35	6.1	1.00	236.0	108.4	2.00	13.1	1.76	49W	6	L313
L388	91.8	4.6	.17	13.9	2.29	167.4	37.8	.70	6.2	.84	49Q	6	L388
L484	1865.0	1777.8	64.11	38.3	6.32	1558.7	1429.2	26.41	23.6	3.18	49P	#	L484
L598	34.8	-52.4	-1.89	.9	.15	NO DATA REPORTED FOR SAMPLE J56					49W	M	L598
L643	110.5	23.3	.84	5.3	.86	161.8	32.3	.60	11.4	1.53	49I	6	L643

GR. MEAN = 87.2 KP CM/SEC GRAND MEAN = 129.6 KP CM/SEC TEST DETERMINATIONS = 4

SD MEANS = 27.7 KP CM/SEC SD OF MEANS = 54.1 KP CM/SEC 10 LABS IN GRAND MEANS

AVERAGE SDR = 6.1 KP CM/SEC AVERAGE SDR = 7.4 KP CM/SEC

TOTAL NUMBER OF LABORATORIES REPORTING = 14

Data from the following laboratories were omitted from the grand means because no viscosity values were reported: 242, 484.

REPORT NO. 61S TAPPI COLLABORATIVE REFERENCE PROGRAM SEPTEMBER 1979

ANALYSIS T49-1 TABLE 2

SURFACE PICK STRENGTH, IGT - VISCOSITY VELOCITY PRODUCT (VVP) IN KILOPOISE CENTIMETERS/SECOND

TAPPI SUGGESTED METHODS T514 SU-69 AND T499 SU-64

LAB CODE	F	MEANS J54	J56	COORDINATES MAJOR	MINOR	AVG RO.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L598	M	34.8				.15	49W	SURFACE PICK STRENGTH,IGT, OIL
L190C	6	56.7	69.0	-07.8	.4	.02	49T	SURFACE PICK STRENGTH,IGT, IPC FLUID
L122	6	63.7	76.9	-07.7	-2.4	.30	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L277	6	72.1	88.2	-43.8	-4.9	1.05	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L280	6	73.0	112.2	-21.9	5.0	1.12	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L182I	6	74.8	82.6	-47.6	-9.8	1.22	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L207	6	83.0	132.0	.3	4.8	.30	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L291	M	87.0				1.39	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L388	6	91.8	167.4	35.9	12.6	1.96	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L149	6	93.9	167.8	37.2	10.9	1.05	49L	SURFACE PICK STRENGTH,IGT, PIB FLUID
L643	6	110.5	161.8	39.3	-0.6	1.20	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L313	6	152.2	238.0	120.0	-10.2	1.38	49W	SURFACE PICK STRENGTH,IGT, OIL
L242	#	1400.0	2062.5	2314.8	-318.4	10.66	49P	SURFACE PICK STRENGTH,IGT, IGT OIL
L484	#	1865.0	1558.7	2069.8	-958.7	4.75	49P	SURFACE PICK STRENGTH,IGT, IGT OIL
GMEANS:		87.2	129.6			1.00		
		95% ELLIPSE:		190.9	25.8	WITH GAMMA = 63 DEGREES		

REPORT NO. 61S — TAPPI COLLABORATIVE REFERENCE PROGRAM — SEPTEMBER 1979

ANALYSIS T50-1 TABLE 1

SURFACE PICK STRENGTH, WAX NUMBER

TAPPI OFFICIAL TEST METHOD T459 OS-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	SAMPLE J54 149 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	SAMPLE J56 93 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	VAR	F	LAB
L105	8.80	-1.11	-1.77	.45	.83	8.00	-4.79	-7.77	.00	.00	50W	#	L105
L115	10.40	.49	.87	1.14	2.11	13.00	.21	.35	1.00	2.22	50W	@	L115
L158	10.00	.09	.17	.00	.00	13.00	.21	.35	.00	.00	50W	@	L158
L162	10.20	.29	.53	.45	.83	13.60	.81	1.32	.55	1.22	50W	@	L162
L182W	11.20	1.29	2.33	.45	.83	12.40	-.39	-.63	.55	1.22	50W	@	L182W
L183	10.40	.49	.87	.55	1.01	13.20	.41	.67	.84	1.86	50W	@	L183
L195	10.00	.09	.17	1.00	1.85	12.20	-.59	-.95	.84	1.86	50W	@	L195
L213	10.00	.09	.17	.00	.00	13.00	.21	.35	.00	.00	50W	@	L213
L225	9.80	-.11	-.19	.84	1.55	14.00	1.21	1.97	.00	.00	50W	@	L225
L228	9.80	-.11	-.19	.45	.83	13.00	.21	.35	.00	.00	50W	@	L228
L230	9.60	-.31	-.55	.55	1.01	12.40	-.39	-.63	.55	1.22	50W	@	L230
L285	9.20	-.71	-1.27	.45	.83	11.80	-.99	-1.60	.45	.99	50W	@	L285
L339	10.20	.29	.53	.45	.83	12.20	-.59	-.95	.45	.99	50W	@	L339
L366	9.40	-.51	-.91	.55	1.01	12.40	-.39	-.63	.55	1.22	50W	@	L366
L567	9.00	-.91	-1.63	.71	1.31	13.40	.61	1.00	.55	1.22	50W	@	L567
L616	9.40	-.51	-.91	.55	1.01	12.20	-.59	-.95	.45	.99	50W	@	L616
L697	9.00	-.91	-1.63	1.22	2.26	9.40	-3.39	-5.50	.55	1.22	50W	#	L697

GR. MEAN = 9.91 WAX NUMBER — GRAND MEAN = 12.79 WAX NUMBER — TEST DETERMINATIONS = 5

SD MEANS = .55 WAX NUMBER — SD OF MEANS = .62 WAX NUMBER — 15 LABS IN GRAND MEANS

AVERAGE SDR = .54 WAX NUMBER — AVERAGE SDR = .45 WAX NUMBER

TOTAL NUMBER OF LABORATORIES REPORTING = 17

Best values: J54 10.0 ± 0.9 wax number
J56 12.8 ± 1.1 wax number

The following laboratories were omitted from the grand means because of extreme test results: 105, 697.

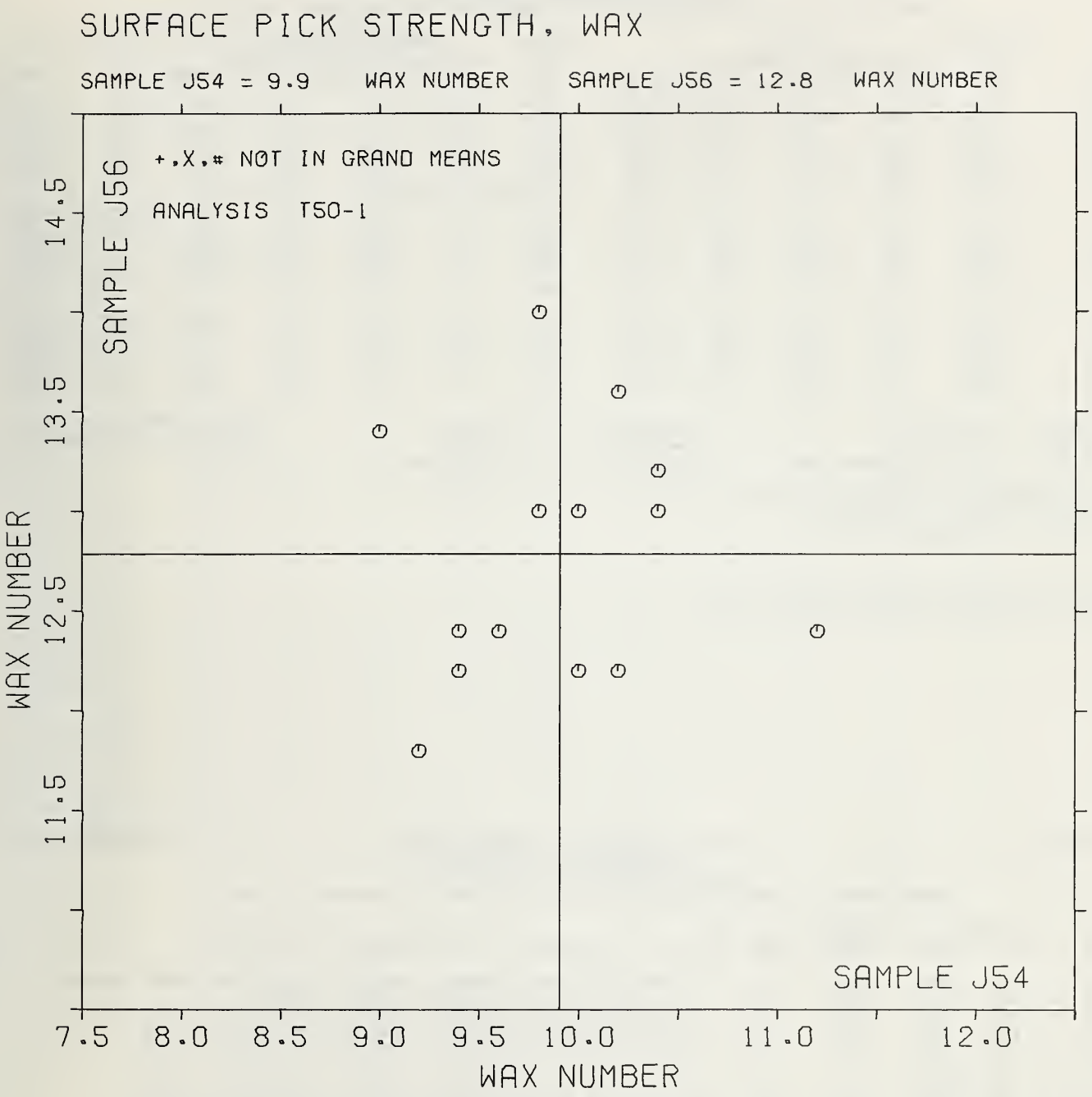
REPORT NO. 61S — TAPPI COLLABORATIVE REFERENCE PROGRAM — SEPTEMBER 1979

ANALYSIS T50-1 TABLE 2

SURFACE PICK STRENGTH, WAX NUMBER

TAPPI OFFICIAL TEST METHOD T459 OS-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	F	MEANS J54	J56	COORDINATES MAJOR	MINOR	AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
105	#	8.80	8.00	-4.66	-.70	.41	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
697	#	9.00	9.40	-3.49	-.38	1.74	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
567	@	9.00	13.40	.24	1.07	1.26	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
285	@	9.20	11.80	-1.18	.30	.91	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
616	@	9.40	12.20	-.73	.26	1.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
366	@	9.40	12.40	-.94	.53	1.11	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
230	@	9.60	12.40	-.47	.15	1.11	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
228	@	9.80	13.00	.16	.18	.41	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
225	@	9.80	14.00	1.09	.54	.77	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
158	@	10.00	13.00	.23	-.01	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
213	@	10.00	13.00	.23	-.01	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
195	@	10.00	12.20	-.51	-.30	1.85	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
162	@	10.20	13.60	.86	.02	1.02	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
339	@	10.20	12.20	-.44	-.49	.91	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
115	@	10.40	13.00	.36	-.38	2.16	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
183	@	10.40	13.20	.36	-.31	1.44	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
182W	@	11.20	12.40	.11	-1.35	1.02	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
MEANS:		9.91	12.79			1.00		
		95% ELLIPSE:		1.79	1.55	WITH GAMMA = 68 DEGREES		


SURFACE PICK STRENGTH, WAX
SAMPLE J54 = 9.9 WAX NUMBER
SAMPLE J56 = 12.8 WAX NUMBER
+,X,# NOT IN GRAND MEANS
ANALYSIS T50-1
SAMPLE J56
SAMPLE J54
WAX NUMBER
14.5
13.5
12.5
11.5
7.5
8.0
8.5
9.0
9.5
10.0
11.0
12.0
WAX NUMBER

REPORT NO. 613 TAPPI COLLABORATIVE REFERENCE PROGRAM SEPTEMBER 1979

ANALYSIS T91-1 TABLE 1

CONCORA MEDIUM TEST, NEWTONS(CMT)

TAPPI OFFICIAL TEST METHOD T809 OS-71, FLAT CRUSH OF CORRUGATING MEDIUM

LAB	SAMPLE E67 LINERBOARD 143 GRAMS PER SQUARE METER					SAMPLE Z09 CORRUGATING MEDIUM 132 GRAMS PER SQUARE METER					TEST D_0 = 10		
CODE	MEAN	DEV	N_0DEV	SDR	R_0 SDR	MEAN	DEV	N_0DEV	SDR	R_0 SDR	VAR	F	LAB
L182	187	-4	-.24	7	.54	253	7	.58	9	.71	91N	ö	L182
L185	202	11	.59	12	.94	260	15	1.18	17	1.32	91A	ö	L185
L218	166	-26	-1.43	6	.46	261	15	1.20	13	.98	91A	ö	L218
L242	162	-29	-1.60	6	.51	176	-69	-5.45	8	.65	91G	#	L242
L248	231	39	2.15	20	1.58	257	12	.90	15	1.14	91B	ö	L248
L269	194	2	.13	9	.74	248	2	.19	8	.58	91P	ö	L269
L280	213	22	1.20	25	1.99	264	19	1.47	14	1.10	91N	ö	L280
L313	197	5	.30	13	1.04	227	-19	-1.46	5	.35	91L	ö	L313
L329	167	-25	-1.38	7	.59	238	-7	-.58	14	1.05	91P	ö	L329
L394	176	-16	-.87	8	.62	233	-13	-1.00	21	1.63	91P	ö	L394
L484	179	-13	-.70	10	.80	229	-16	-1.24	12	.92	91N	ö	L484
L621	204	12	.65	21	1.72	232	-13	-1.01	18	1.41	91P	ö	L621
L622	179	-12	-.68	14	1.16	237	-9	-.68	8	.64	91N	ö	L622
L650	186	-5	-.29	13	1.05	244	-1	-.10	14	1.05	91N	ö	L650
L666	201	10	.54	9	.76	252	7	.54	15	1.13	91S	ö	L666

GR_0 MEAN = 192 N(CMT) GRAND MEAN = 245 N(CMT) TEST DETERMINATIONS = 10

SD MEANS = 18 N(CMT) SD OF MEANS = 13 N(CMT) 14 LABS IN GRAND MEANS

AVERAGE SDR = 12 N(CMT) AVERAGE SDR = 13 N(CMT)

GR_0 MEAN = 43.08 POUNDS GRAND MEAN = 55.14 POUNDS

TOTAL NUMBER OF LABORATORIES REPORTING = 15

Best values: E67 190 ± 30 newtons

Z09 240 ± 20 newtons

The following laboratories were omitted from the grand means because of extreme test results: 242.

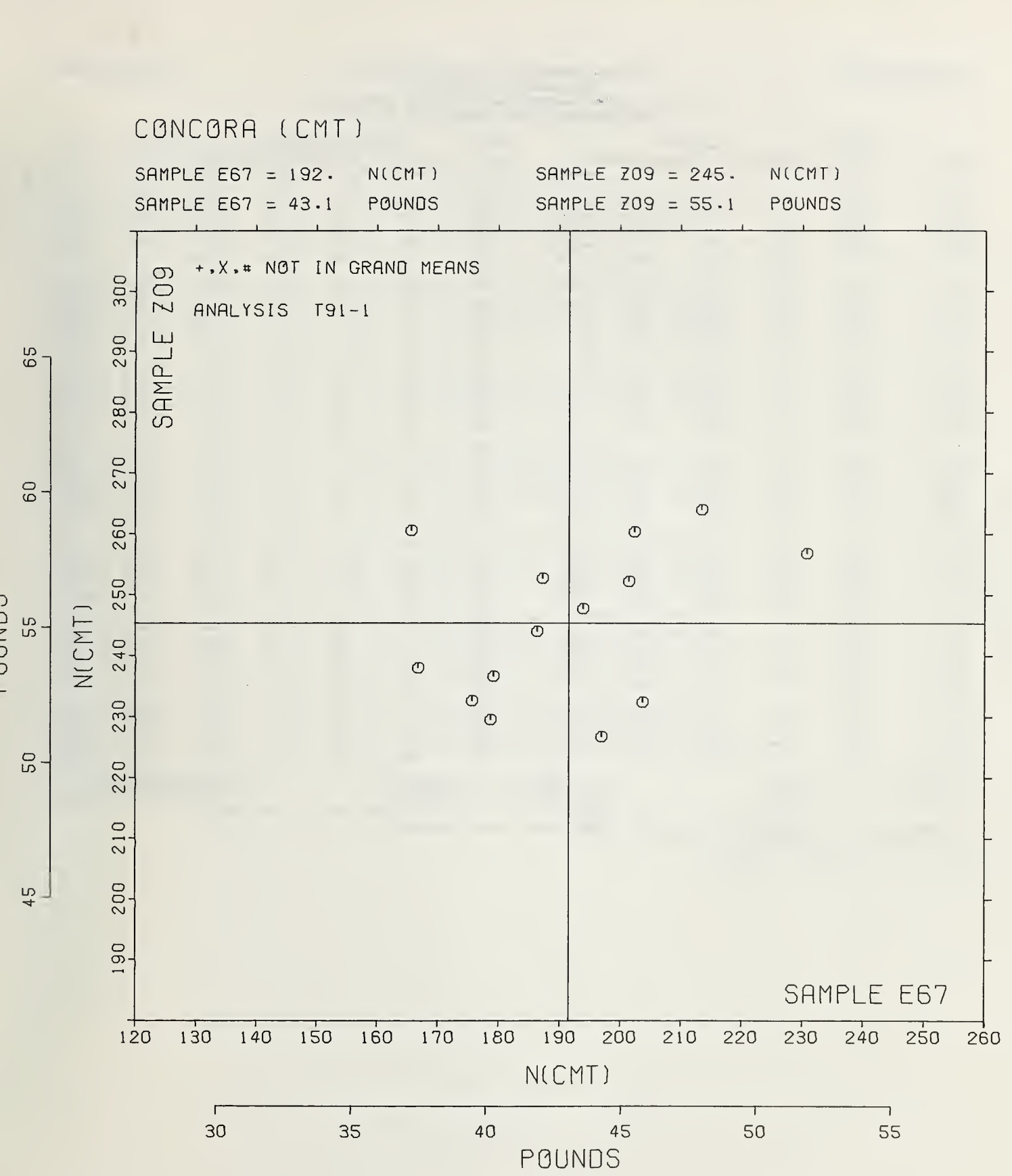
REPORT NO. 613 TAPPI COLLABORATIVE REFERENCE PROGRAM SEPTEMBER 1979

ANALYSIS T91-1 TABLE 2

CONCORA MEDIUM TEST, NEWTONS(CMT)

TAPPI OFFICIAL TEST METHOD T809 OS-71, FLAT CRUSH OF CORRUGATING MEDIUM

LAB		MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
CODE	F	E67	Z09	MAJOR	MINOR	K_0 SDR	VAR	
L242	#	162	176	-5.3	-5.3	.38	91G	FLAT CRUSH STRENGTH, CONCORA, GAYDON FLAT CRUSH TESTER
L218	ö	166	261	-1.0	2.4	.72	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L329	ö	167	238	-2.0	3	.02	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L394	ö	176	233	-2.3	-.3	1.12	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L484	ö	179	229	-1.8	-1.0	.86	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L622	ö	179	237	-1.3	-.3	.90	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L650	ö	186	244	-.3	1	1.05	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L182	ö	187	253	-.1	.6	.62	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L269	ö	194	248	.3	1	.86	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L313	ö	197	227	-.2	-1.9	.69	91L	FLAT CRUSH STRENGTH, CONCORA, LIBERTY
L666	ö	201	252	1.2	.3	.94	91S	FLAT CRUSH STRENGTH, CONCORA, TOYO SEIKI (METHOD JIS-P-8126)
L185	ö	202	260	1.0	1.0	1.15	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L621	ö	204	232	.6	-1.7	1.30	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L280	ö	213	264	2.3	.9	1.35	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L248	ö	231	257	4.3	-.4	1.33	91B	FLAT CRUSH STRENGTH, CONCORA, INSTRON
GMEANS:		192	245			1.00		
		95% ELLIPSE:		5.6	3.3	WITH GAMMA = 22 DEGREES		


CONCORA (CMT)
SAMPLE E67 = 192. N(CMT)
SAMPLE E67 = 43.1 POUNDS
SAMPLE Z09 = 245. N(CMT)
SAMPLE Z09 = 55.1 POUNDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T91-1
SAMPLE Z09
N(CMT)
SAMPLE E67
N(CMT)
POUNDS

ANALYSIS T96-1 TABLE 1

RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)

TAPPI OFFICIAL TEST METHOD T818 OS-76

LAB CODE	SAMPLE E67 LINERBOARD 143 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	SAMPLE Z11 CORRUGATING MEDIUM 132 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R. SDR	TEST D. = 10 VAR	F	LAB
L107	210.	-32.	-1.30	18.	1.11	155.	-21.	-1.09	8.	.72	96P	G	L107
L114	250.	9.	.33	14.	.91	201.	25.	1.30	8.	.81	96P	G	L114
L124	259.	18.	.72	18.	1.15	190.	14.	.73	10.	.92	96P	G	L124
L141	231.	-10.	-.42	16.	1.16	164.	-12.	-.62	20.	1.98	96P	G	L141
L157	230.	-12.	-.46	19.	1.18	181.	5.	.23	5.	.46	96P	G	L157
L171	227.	-14.	-.56	19.	1.17	145.	-31.	-1.60	28.	2.70	96N	G	L171
L182	270.	29.	1.16	14.	.88	192.	16.	.84	8.	.81	96N	G	L182
L191	230.	-11.	-.47	31.	1.98	169.	-7.	-.36	21.	2.07	96P	G	L191
L218	233.	-8.	-.34	16.	1.00	170.	-6.	-.33	11.	1.07	96I	G	L218
L234	200.	-41.	-1.65	24.	1.52	130.	-46.	-2.36	10.	.97	96P	G	L234
L237	202.	21.	.84	25.	1.57	168.	-8.	-.40	12.	1.19	96P	G	L237
L242	295.	54.	2.19	13.	.83	213.	37.	1.89	7.	.69	96G	G	L242
L303	243.	2.	.08	10.	.63	178.	2.	.11	6.	.59	96N	G	L303
L305	226.	-16.	-.65	12.	.78	188.	12.	.62	10.	1.01	96P	G	L305
L329	231.	39.	1.61	14.	.91	194.	18.	.94	8.	.81	96P	G	L329
L333	231.	-10.	-.41	15.	.93	161.	-15.	-.75	6.	.57	96P	G	L333
L350	235.	-6.	-.27	21.	1.33	188.	12.	.60	18.	1.69	96P	G	L350
L393	266.	25.	1.01	19.	1.22	184.	8.	.39	9.	.91	96P	G	L393
L484	210.	-31.	-1.25	13.	.80	157.	-19.	-.97	12.	1.11	96P	G	L484
L553	251.	10.	.41	10.	1.00	169.	13.	.64	10.	.95	96P	G	L553
L562	222.	-20.	-.81	14.	.91	171.	-5.	-.24	17.	1.65	96P	G	L562
L570	204.	-38.	-1.54	13.	.82	139.	-37.	-1.91	5.	.44	96P	G	L570
L580	278.	37.	1.52	12.	.73	199.	23.	1.17	7.	.70	96P	G	L580
L603	223.	-19.	-.70	33.	2.10	153.	-23.	-1.20	9.	.88	96P	G	L603
L610	268.	26.	1.05	10.	.62	196.	20.	1.01	13.	1.28	96P	G	L610
L617	242.	1.	.03	10.	.64	178.	2.	.10	7.	.67	96P	G	L617
L621	249.	8.	.32	19.	1.18	180.	4.	.22	4.	.38	96P	G	L621
L623	264.	22.	.92	8.	.53	180.	4.	.21	8.	.76	96P	G	L623
L649	225.	-16.	-.67	10.	.61	172.	-4.	-.20	7.	.70	96P	G	L649
L650	258.	17.	.69	14.	.87	200.	24.	1.22	7.	.64	96N	G	L650
L663	224.	-17.	-.70	13.	.82	170.	-6.	-.29	12.	1.18	96P	G	L663
L676	260.	18.	.74	8.	.51	196.	22.	1.12	11.	1.06	96P	G	L676
L686	255.	14.	.58	10.	1.02	184.	8.	.39	6.	.61	96P	G	L686
L703	196.	-45.	-1.86	9.	.59	146.	-28.	-1.42	10.	1.01	96J	G	L703

GR. MEAN = 241. NEWTONS GRAND MEAN = 176. NEWTONS TEST DETERMINATIONS = 10

SD MEANS = 24. NEWTONS SD OF MEANS = 20. NEWTONS 34 LABS IN GRAND MEANS

AVERAGE SDR = 10. NEWTONS AVERAGE SDR = 10. NEWTONS

GR. MEAN = 54.26 POUNDS GRAND MEAN = 39.57 POUNDS

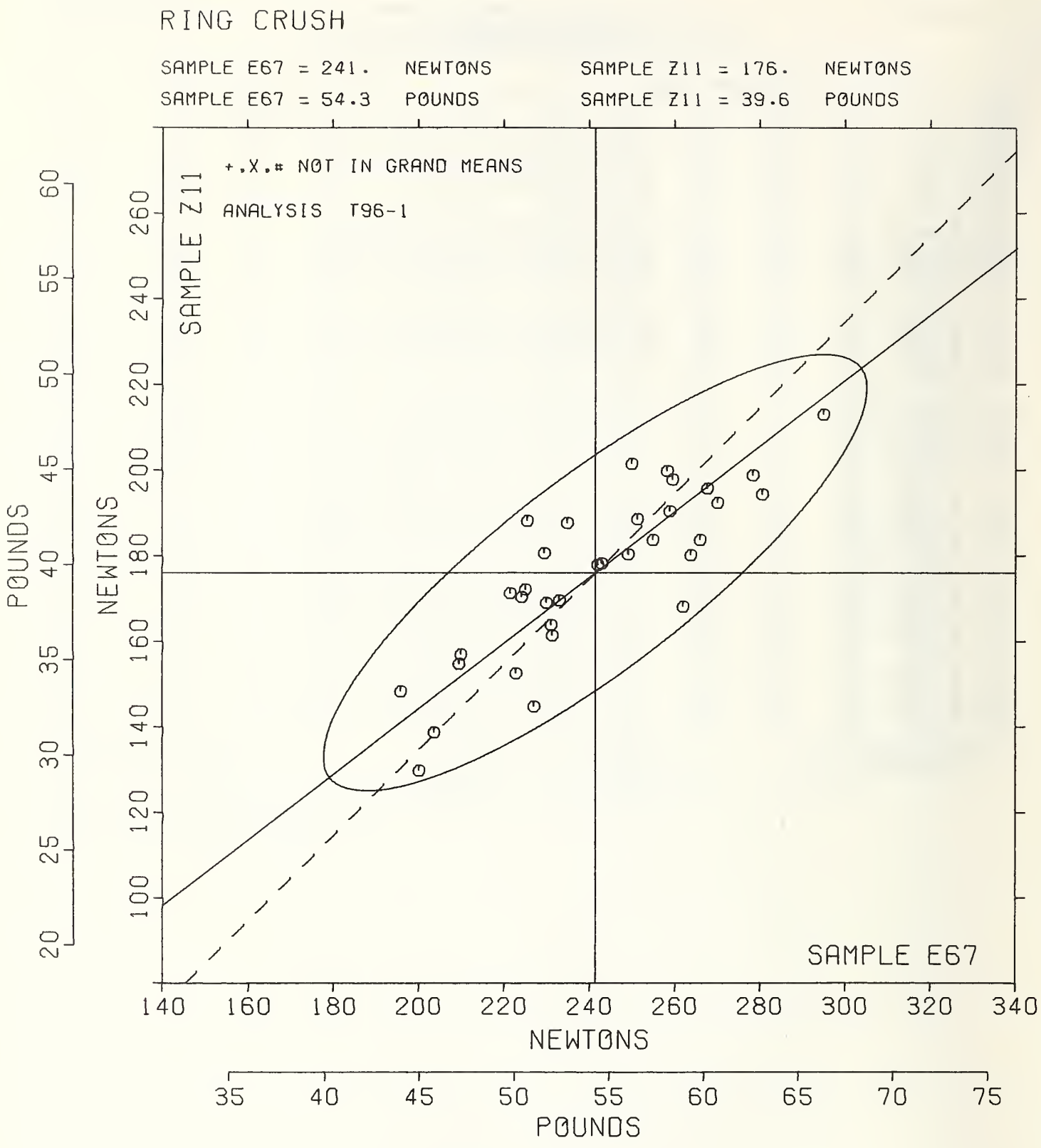
TOTAL NUMBER OF LABORATORIES REPORTING = 34

Best values: E67 240 ± 40 newtons

Z11 180 ± 30 newtons

ANALYSIS T96-1 TABLE 2
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI OFFICIAL TEST METHOD T818 OS-76

LAB CODE	F	MEANS E67	MEANS Z11	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L703	6	196.	148.	-53.	6.	.80	96J	RING CRUSH, INSTRON
L234	6	200.	130.	-61.	-12.	1.24	96P	RING CRUSH, TMI/HINDE & DAUCH
L570	6	204.	139.	-53.	-7.	.83	96P	RING CRUSH, TMI/HINDE & DAUCH
L107	6	210.	155.	-38.	3.	.92	96P	RING CRUSH, TMI/HINDE & DAUCH
L484	6	210.	157.	-36.	4.	.96	96R	RING CRUSH, REGMED
L562	6	222.	171.	-19.	8.	1.28	96P	RING CRUSH, TMI/HINDE & DAUCH
L603	6	223.	153.	-29.	-7.	1.49	96P	RING CRUSH, TMI/HINDE & DAUCH
L663	6	224.	170.	-17.	6.	1.00	96P	RING CRUSH, TMI/HINDE & DAUCH
L649	6	225.	172.	-15.	7.	.86	96P	RING CRUSH, TMI/HINDE & DAUCH
L305	6	226.	188.	-5.	19.	.90	96P	RING CRUSH, TMI/HINDE & DAUCH
L171	6	227.	145.	-36.	-16.	1.94	96N	RING CRUSH, TMI/HINDE & DAUCH
L157	6	230.	181.	-7.	11.	.82	96P	RING CRUSH, TMI/HINDE & DAUCH
L191	6	230.	169.	-13.	1.	2.62	96P	RING CRUSH, TMI/HINDE & DAUCH
L141	6	231.	164.	-18.	-3.	1.37	96P	RING CRUSH, TMI/HINDE & DAUCH
L333	6	231.	161.	-17.	-5.	.75	96P	RING CRUSH, TMI/HINDE & DAUCH
L218	6	233.	170.	-11.	-0.	1.64	96I	RING CRUSH, INSTRON
L350	6	235.	188.	2.	13.	1.51	96P	RING CRUSH, TMI/HINDE & DAUCH
L617	6	242.	178.	2.	1.	.85	96P	RING CRUSH, TMI/HINDE & DAUCH
L303	6	243.	178.	3.	1.	.81	96N	RING CRUSH, TMI/HINDE & DAUCH
L621	6	249.	180.	9.	-1.	.78	96P	RING CRUSH, TMI/HINDE & DAUCH
L114	6	250.	201.	22.	15.	.86	96P	RING CRUSH, TMI/HINDE & DAUCH
L553	6	251.	189.	10.	4.	.98	96P	RING CRUSH, TMI/HINDE & DAUCH
L686	6	255.	184.	15.	-2.	.82	96P	RING CRUSH, TMI/HINDE & DAUCH
L650	6	258.	200.	28.	9.	.75	96N	RING CRUSH, TMI/HINDE & DAUCH
L124	6	259.	190.	23.	1.	1.03	96P	RING CRUSH, TMI/HINDE & DAUCH
L676	6	260.	198.	28.	6.	.78	96P	RING CRUSH, TMI/HINDE & DAUCH
L237	6	262.	168.	12.	-19.	1.38	96P	RING CRUSH, TMI/HINDE & DAUCH
L623	6	264.	180.	20.	-10.	.85	96P	RING CRUSH, TMI/HINDE & DAUCH
L393	6	266.	184.	24.	-9.	1.08	96P	RING CRUSH, TMI/HINDE & DAUCH
L610	6	268.	196.	33.	-0.	.95	96P	RING CRUSH, TMI/HINDE & DAUCH
L182	6	270.	192.	33.	-5.	.84	96N	RING CRUSH, TMI/HINDE & DAUCH
L580	6	278.	199.	43.	-4.	.71	96P	RING CRUSH, TMI/HINDE & DAUCH
L329	6	281.	194.	42.	-9.	.86	96P	RING CRUSH, TMI/HINDE & DAUCH
L242	6	295.	213.	55.	-3.	.76	96G	RING CRUSH, GAYDON FLAT CRUSH TESTER
GMEANS:		241.	176.			1.00		
		95% ELLIPSE:		7.	22.	WITH GAMMA = 37 DEGREES		


RING CRUSH
SAMPLE E67 = 241. NEWTONS
SAMPLE E67 = 54.3 POUNDS
SAMPLE Z11 = 176. NEWTONS
SAMPLE Z11 = 39.6 POUNDS
+.X.# NOT IN GRAND MEANS
ANALYSIS T96-1
SAMPLE Z11
SAMPLE E67
NEWTONS
POUNDS
100 120 140 160 180 200 220 240 260
20 25 30 35 40 45 50 55 60
140 160 180 200 220 240 260 280 300 320 340
35 40 45 50 55 60 65 70 75

SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
BURSTING STRENGTH, MODEL C	J68	17.10	1.29	1.08	15	38	47	10	.94	3.61
T10-1 PSI	K38	28.42	1.90	1.93					1.69	5.35
BURSTING STRENGTH, MODEL C-A	J68	17.06	1.61	1.11	15	40	43	10	.97	4.51
T10-2 PSI	K38	27.57	2.27	1.77					1.55	6.36
BURSTING STRENGTH, HIGH RANGE	K28	49.7	2.4	3.8	15	39	50	10	3.3	6.9
T11-1 PSI	B63	61.6	3.2	4.1					3.6	9.1
TEARING STRENGTH, PRINTING PAPERS	G08	39.0	1.9	1.5	15	116	135	10	1.4	5.4
T15-1 GRAMS	B86	40.2	2.2	1.3					1.1	6.1
TEARING STRENGTH, PACKAGING PAPERS	K36	116.1	3.6	4.3	15	4	15	10	3.8	10.3
T16-1 GRAMS	B63	132.1	6.0	5.6					4.9	16.8
TENSILE STRENGTH, PACKAGING PAPERS	K34	9.55	.30	.61	20	44	49	10	.53	.92
T19-1 KILONEWTON/M	J02	5.65	.32	.22					.19	.89
TENSILE STR., CRE, PRINTING PAPERS	G08	3.219	.193	.141	20	45	51	10	.124	.542
T20-1 KILONEWTON/M	J72	3.627	.207	.154					.135	.582
TENSILE STR., PENDULUM, PRINTING P.	G08	3.26	.21	.15	20	41	41	10	.13	.58
T20-2 KILONEWTON/M	J72	3.68	.16	.18					.16	.46
T.E.A., PACKAGING PAPERS	K34	95.9	5.9	13.2	20	17	19	10	11.6	18.4
T25-1 JOULES/SQ M	J02	80.3	7.6	9.3					8.1	21.8
T.E.A., PRINTING PAPERS	G08	33.7	1.6	3.6	20	15	19	10	3.2	4.9
T26-1 JOULES/SQ M	J72	40.8	2.6	4.4					3.8	7.7
ELONGATION TO BREAK, PACKAGING PAPER	K34	1.74	.16	.15	20	16	16	10	.14	.45
T28-1 PERCENT	J02	2.15	.18	.18					.16	.51
ELONGATION TO BREAK, PRINTING PAPER	G08	1.618	.172	.141	20	19	24	10	.123	.485
T29-1 PERCENT	J72	1.720	.225	.148					.129	.629
FOLDING ENDURANCE (MIT)	B68	51.3	13.8	20.3	15	33	39	10	17.8	39.5
T30-1 DOUBLE FOLDS	B30	16.6	2.1	4.7					4.1	6.3
FOLDING ENDURANCE (MIT)	B86	1.672	.118	.167	15	32	39	10	.146	.337
T30-2 LOG(10) FOLD	B30	1.200	.055	.122					.107	.164
STIFFNESS, GURLEY	J28	466.	34.	26.	10	32	33	10	23.	94.
T35-1 GURLEY UNITS	K04	242.	28.	13.					12.	78.
STIFFNESS, TABER	B63	18.88	.91	.79	10	27	32	5	.98	2.63
T36-1 TABER UNITS	Z01	62.71	3.68	2.47					3.06	10.43
SURFACE PICK STRENGTH, IGT	J54	87.2	27.7	6.1	4	10	14	4	8.4	76.8
T49-1 KP CM/SEC	J56	129.6	54.1	7.4					10.3	149.9
SURFACE PICK STRENGTH, WAX	J54	9.91	.55	.54	5	15	17	5	.67	1.54
T50-1 WAX NUMBER	J56	12.79	.62	.45					.56	1.71
CONCORA (CMT)	E67	192.	16.	12.	10	14	15	10	11.	50.
T91-1 N(CMT)	Z09	245.	13.	13.					11.	35.
RING CRUSH	E67	241.	24.	16.	10	34	34	10	14.	68.
T96-1 NEWTONS	Z11	170.	20.	10.					9.	54.

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16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

Collaborative Reference Programs provide participating laboratories with the means for checking periodically the level and uniformity of their testing in comparison with that of other participating laboratories. An important by-product of the programs is the provision of realistic pictures of the state of the testing art. This is one of the periodic reports showing averages for each participant, within and between laboratory variability, and other information for participents and standards committees.

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